THE GENEALOGY OF LAW AND TERRITORIAL REALITIES:

Dogmatic Reinterpretations, Autonomy, and Normative Diversity



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FOREWORD

THE VINCULUM JURIS OF CONTEMPORANEITY

Approaching a work of such scope and conceptual depth as the one presented here to the reader is not merely an act of academic courtesy, but an urgent axiological and dogmatic challenge. Contemporary legal scholarship suffers, with alarming frequency, from a reductive presentism a hermeneutic pathology that conceives of positive institutions as mere contingent emanations of modern legislative technique, ignoring the fact that every formula, every aphorism, and every procedural structure is, strictly speaking, sediment that has settled over millennia of civilizational dialectic.

The volume for which I have the privilege of writing the foreword responds to an urgent epistemological need: to subject the foundational matrices of the Romano-Germanic tradition to critical scrutiny, examining its dogmatic mutations, its underlying continuities, its intersections with fiscal sociology, and its dialectical tension in the face of peripheral realities and subaltern normative paradigms. This book is not conceived as a haphazard anthology nor as an unsystematic juxtaposition of dogmatic essays. Rather, it is the refined result of a rigorous international call for papers that brought together legal scholars, legal historians, and social theorists affiliated with prestigious universities and research centers of global reach from Sassari, Buenos Aires, Cagliari, and Rome, to Budapest, Mexico City, and the emerging Ecuadorian academic community.

The genesis of this intellectual endeavor has been arduous and sustained. It has required more than a year of uninterrupted research and editorial work, preceded by months of meticulous compilation, double-blind peer review conducted under the most exacting standards of the scientific method, and iterative philological and exegetical revisions. It is essential to express explicit gratitude to each of the participating universities, chairs, and research institutes, whose institutional support and direct funding for their respective projects made it possible to carry out this research without ideological conditioning or submission to commercial pragmatism. This collective effort is tangible proof that public universities and disinterested academia constitute the last bastions for the production of long-term critical thought.

The central axis that underpins this compilation begins with a confrontation rooted in legal philosophy and historiography: the authentic ontology of the Roman legal system and the vicissitudes of its reception in continental Europe and Latin America. As the lucid contribution by Giovanni Lobrano (University of Sassari) rightly points out, the dominant comparative legal doctrine committed a conceptual distortion by retrospectively enshrining the fiction of a monolithic continuity in the so-called Roman-Germanic system.

Lobrano's thesis demonstrates that the Western legal tradition has historically oscillated between two antinomic models: the republican-participatory model of Roman origin where the populus functions as an active collective subject, the inalienable holder of sovereignty, and the direct architect of legal precepts and the Anglo-Saxon monarchical-representative model, dogmatically consolidated in the nineteenth century by the German Historical School and Pandectism. By deconstructing the theoretical frameworks of Savigny, Windscheid, and Laband, it becomes clear how the theorization of the legal person stripped collectives of their natural capacity to act, imposing the technical concept of vicarious representation to compensate for a supposed inherent incapacity.

This conceptual transformation profoundly altered the landscape of public and private law: citizen self-governance was gradually subsumed into a dogma of bureaucratic and parliamentary heteronomy. The reception of these nineteenth-century categories in Latin America paradigmatically reflected in the writings of Andrés Bello, Dalmacio Vélez Sarsfield, and Teixeira de Freitas ultimately dismantled the memory of classical municipalist republicanism, bequeathing a hyper-formalist and statist conception that marginalized direct practices of democratic deliberation.

In contrast to the tendency to confine Roman law to Justinian's monumental work, the groundbreaking philological and dogmatic research by José Carlos Costa (University of Buenos Aires) offers a contribution of incalculable historiographical and methodological value: the critical translation and exegetical analysis of the Gregorian and Hermogenian Codes. Based on the reconstructions by Paul Krüger and Gustav Haenel, this study rescues from oblivion the first two systematic compilations of imperial constitutions from the Late Empire, restoring the missing link between classical jurisprudence (iura) and the great late imperial codifications (leges).

Costa's exegesis demonstrates that the late Roman compilers were not mere bureaucratic copyists, but jurists guided by the practical imperative of restoring legal certainty in the face of the normative chaos resulting from the proliferation of rescripts and edicts. His analysis confirms the emergence of institutions that underpin modern property law:

The dogmatic establishment of real property accession under the principle superficies solo cedit and the strict settlement of expenses with the possessor, whether in good or bad faith.

The technical demarcation of the attorney's procedural representation, enshrining the principle of specificity of the mandate vis-à-vis extraordinary dispositive powers such as settlement.

The limitation of legal protection for minors against clumsy or deceitful conduct, foreshadowing the doctrine of one's own acts and legitimate expectations.

The evolution of family property guardianship in light of the Senatusconsultum Macedonianum.

The publication of these sources with critical apparatus in Spanish not only democratizes access to Roman law studies in Ibero-America but also confirms that the Justinian codification was directly indebted to the compositional technique of these pre-Justinian texts.

The geographical and historical spread of the Roman model is admirably demonstrated through the studies by Gábor Hamza (Eötvös Loránd University, Budapest), Valentina Cvetković-Đorđević (University of Cagliari), and Jean-François Gerkens (University of Liège).

The exhaustive map of legal transfers drawn up by Hamza documents how private law in Mexico and Central America was not a mere mimetic transposition of the Napoleonic Code Civil of 1804. Latin American codification constituted a sophisticated dogmatic interweaving in which Germanic pandectist dogmatics, Hispanic colonial law (the Recopilación de Leyes de Indias, the Novísima Recopilación, and García Goyena's influential 1851 draft), along with local innovations as early as those of Justo Arosemena in Panama or the Mexican state civil codes (particularly those of Oaxaca and the Federal District from 1928–1932). Hamza demonstrates the structural resilience of the Romanistic tradition, which has preserved to the present day the formal dualism between civil and commercial law and serves as the axiological foundation for continental private-law integration.

In a convergent vein, Cvetković-Đorđević examines the fascinating uniqueness of Serbia: a nation situated at the geopolitical crossroads between East and West, whose legal system underwent two divergent waves of Roman law reception. The first, with a medieval and Byzantine imprint

(ius graeco-romanum), crystallized in Saint Sava's Zakonopravilo (Nomocanon) and the famous Code of Dušan of 1349 where the emperor's submission to the rule of law was enshrined at an early stage. The second wave, of a nineteenth-century nature, gave rise to the Serbian Civil Code of 1844, drafted by Jovan Hadžić, which drew on the Austrian ABGB of 1811 but was adapted to the local communal institution of the zadruga. What is truly revealing about the study is the demonstration of how, even under the ideological aegis of Yugoslav self-management socialism, the categories of the ius commune persisted structurally in Prof. Konstantinović's 1978 Law of Obligations, exerting a decisive influence on the 21st-century draft proposals for civil recodification.

For his part, Gerkens offers a brilliant deconstruction of the 21st-century Belgian recodification spearheaded during Minister Koen Geens's tenure. After more than two centuries of almost unaltered application of the Napoleonic Code, Belgium has adopted a decapartite structure, replacing the classical Gaius-Justinian tripartite division (personae, res, actiones) with a functional framework that treats tort liability and the burden of proof as separate, self-contained sections. However, Gerkens presents a fascinating theoretical paradox: that of an "invisible tradition." By analyzing the definitions of obligation as iuris vinculum (Art. 5.1), the continued existence of natural obligations (Art. 5.2), and the four-part division of the sources of obligations (Art. 5.3), it becomes clear that modern Belgian legal doctrine continues to reproduce in many cases without full historical awareness the core categories of Justinian's Digest and Institutions.

The analysis of Roman law as a technical discipline is inextricably linked to its ethical and anthropological dimensions. In his rigorous contribution, Eduardo Daniel Hernández Ríos (National Autonomous University of Mexico) sets out to demonstrate a bold thesis: the existence, within Roman jurisprudence, of an implicit prototype of conduct grounded in a minimum standard of rationality and moral rectitude required of human beings.

Through a meticulous examination of categories such as the boni viri arbitratu, culpa lata, the prohibition against fraud, and the remedy of the condictio ob turpem vel iniustam causam, Hernández Ríos demonstrates that the Roman legal system never conceived of the individual as an amoral economic actor empowered to exercise his or her powers arbitrarily. The Pauline notion that inexcusable fault is equivalent to fraud (culpa lata dolo aequiparatur), defined by Ulpian as "failing to understand what everyone understands," establishes an objective threshold of socially expected diligence. Anyone who, in exercising their prerogative, causes disproportionate harm, or who seeks to bring a legal action by invoking their own immorality (nemo auditur propriam turpitudinem allegans), is denied judicial relief. This Roman legacy constitutes the direct precursor to the theory of abuse of rights, objective good faith, and the social function of property that govern contemporary comparative private law.

This ethical concern for the substance of contractual justice finds a contemporary echo in the work of Enrico del Prato(Sapienza University of Rome). The Italian jurist dissects the crisis of the liberal dogma of contractual autonomy at the pre-contractual level. Starting from the observation that the formal equality enshrined in nineteenth-century codifications often masks relationships of brutal technical, economic, and informational asymmetry, Del Prato establishes the legitimacy of state control over freedom of negotiation. The establishment of "protective nullities," the substantive control of unfair terms in consumer contracts, and the application of "virtual nullity" for violations of mandatory rules and constitutional principles demonstrate that modern property law has definitively shifted from contractual abstraction toward substantive justice and the protection of human dignity.

This work does not shy away from the most contentious debates in contemporary social theory. Quite the contrary, it delves into the areas where traditional law has functioned as an instrument of exclusion or dogmatic coloniality.

The incisive study by Maria Virginia Sanna (University of Belgrade) analyzes the archaeology of gender discrimination based on legal and literary sources from classical and imperial Rome. By unraveling normative categories such as patria potestas, manus, tutela mulierum founded on the prejudice of infirmitas sexus and levitas animi and the Augustan moralization of the materfamilias honorata, Sanna demonstrates that the Roman social order subordinated women's civic standing to their reproductive subordination and confinement within the domus. An examination of the famous and controversial case of Cato's "cession of Marzia" confirms how the prerogatives of female personhood were subordinated to inter-male pacts concerning civic lineage. This patriarchal framework, historically transmitted through Renaissance medicine and medieval law, sheds light on the ideological roots that still fuel the wage gap, the penalization of motherhood, and the difficulties in achieving substantive equality in the 21st century.

Following a similar path of challenging classical models, David Esborraz (University of Rome "Tor Vergata") calls into question the individualistic categories of nineteenth-century intellectual property law as they relate to the cultural expressions and traditional knowledge of indigenous peoples and people of African descent. Flagrant cases of cultural appropriation and international biopiracy in the textile and fashion industries such as the controversies surrounding the designs of the Mixe huipil in relation to French fashion houses or the misappropriation of the Guna mola expose the inadequacy of conventional copyright frameworks, which are structured around the notions of an individual author, temporal novelty, and a fixed material medium.

Esborraz formulates a theoretical proposal of enormous dogmatic value: to recover the classification of things from Justinian's Institutes (I.2.1 pr.) in particular the res universitatis and the res communes to construct an ad hoc status that recognizes this knowledge as belonging to the ontological category of collective goods. In this way, the study circumvents the dogmatic trap imposed by the liberal model, which by conceiving ancestral communal creations as works without a known author cast them into the realm of res nullius, leaving them in a state of legal abandonment that enabled their unrestricted transnational commercial exploitation.

The tension between Western formalist hegemony and local dynamics reaches its culmination in the chapters devoted to the Ecuadorian and Andean contexts. The study by Odette Martínez Pérez, Holguer Geovanny García Segarra, Edward Fabricio Freire, and Gema Sarahy Landeta (Bolivarian University of Ecuador) addresses the complex coexistence between the neo-Romanist monist framework, the argumentative techniques of common law (through constitutional review and binding precedent), and the ancestral indigenous jurisdiction formally recognized in Article 171 of the 2008 Constitution of Ecuador. The authors demonstrate that, despite the jurisprudential advances emanating from the Constitutional Court (e.g., the famous ruling in the "La Cocha" case), colonial resistance persists in practice among those administering ordinary justice. The exaggerated primacy of the written legal text and deductive syllogism clash head-on with the epistemologies of the Global South, based on orality, the communal restoration of harmony, and the Sumak Kawsay worldview.

Finally, the book transcends the strictly doctrinal realm to ground itself in the material dimension of territorial sustainability. The rigorous empirical research by Narcisa Jockebec Rendón Guerrero (Bolivarian University of Ecuador), based on a field survey that included finance directors from 26 municipalities in 21 provinces of Ecuador, offers a stark assessment of the fragility of local public finances. The data collected reveal that more than 70% of municipalities

with fewer than 50,000 inhabitants are critically dependent on transfers from the central government (accounting for more than 75% of the budget in one-third of them). This budgetary subordination, exacerbated by systematic delays in fiscal allocations, undermines the political autonomy of local governments and neutralizes their capacity for implementation. Rendón Guerrero demonstrates that the consolidation of territorial autonomy urgently requires overcoming the urban-rural cadastral gap (present in more than 40% of municipal councils) and accelerating the digital modernization of tax collection a sine qua non condition for transforming constitutional mandates for decentralization into a tangible reality.

The dogmatic panorama unfolded by this compilation teaches us that legal institutions are neither neutral geometries nor soulless technical formalities. On the contrary, they embody the living tensions of the society that gives rise to them: the dispute between popular self-government and representative delegation; the dialectic between codified rigor and equitable flexibility; the struggle for the recognition of communal memories in the face of the voracity of the globalized market; and the ceaseless search for ethical parameters that curb the abuse of economic power and the perpetuation of hierarchies of domination.

The pages that follow this preface require more from the reader than a passive or rote review. They demand a reflective disposition, an openness to the historical-comparative method, and a critical sensibility capable of questioning our own civil codes, procedural laws, and constitutions in light of their origins and epistemological contradictions. On behalf of the international academic community that sponsored, funded, and nurtured this ambitious project over the course of an entire year, I extend a heartfelt invitation to explore this volume. May its reading spark new scholarly debates, and may its conclusions serve as an analytical compass for building a legal science that is more profound, more just, and lucidly aware of its history.

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"Legal Systems" and Their "General Principles" Which Roman legal system?

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Introduction

Contemporary reflection on legal systems requires moving beyond a merely normative understanding of law and reclaiming a structural perspective that allows us to identify the general principles that guide its content, evolution, and historical legitimacy. In this regard, the distinction between a legal order and a legal system is particularly relevant, since while the former is linked to the effectiveness of a set of rules grounded in a fundamental norm, the latter refers to the guiding principles that determine the internal rationality and axiological orientation of legal institutions (David & Jauffret-Spinosi, 2002; Glenn, 2014).

This issue takes on special importance when analyzing the Western legal tradition and the historical construction of what is currently referred to as the Romano-Germanic system. Comparative legal scholarship has shown that traditional classifications of legal families tend to prioritize formal criteria such as legislative technique, legal language, or the status attributed to judicial precedent while relegating to the background the substantive foundations that explain the various forms of political and legal organization (Glenn, 2014; Sacco, 1991). From this perspective, the question of what the true general principles are that distinguish legal systems remains an open issue within the general theory of comparative law.

Various authors have pointed out that one of the most useful categories for understanding these differences is the mode of action of collective units and, in particular, of the people as a political subject. From this perspective, the Western legal tradition has historically oscillated between two opposing models: a participatory model, identified with the Roman republican experience, and a representative model, associated with English constitutionalism and later consolidated by 19th-century German legal doctrine (Catalano, 1980; Lobrano, 2006). This tension between self-government and representation constitutes one of the central interpretive frameworks for understanding the evolution of modern public institutions.

Recent legal historiography has emphasized that Roman law should not be understood exclusively as a set of private institutions inherited by modern codification, but rather as a comprehensive historical experience that articulated specific conceptions of citizenship, political participation, authority, and collective organization. Consequently, the study of the general principles of Roman law allows us to identify elements that transcend the strictly civil sphere and extend into constitutional theory, political theory, and contemporary public law (Stein, 1999; Schiavone, 2012).

In this context, this chapter critically examines the transformation undergone by the Roman legal tradition since the nineteenth century, when German pandectist doctrine reformulated the notion of the legal person and attributed to collectives an inherent inability to act, gradually displacing the participatory conception that had characterized the classical republican model. Based on this historical reconstruction, this chapter aims to analyze the coexistence of two distinct conceptions of the so-called "Roman system": one linked to the republican-participatory paradigm and the other associated with the representative paradigm developed by Savigny, Windscheid, and Laband, whose reception in Latin America had profound consequences for the shaping of modern civil legal systems (Watson, 2003; Zimmermann, 1996).

Finally, this study adopts a historical-comparative approach, aimed at reviving the debate on the general principles that structure legal systems and reflecting on the persistence of Roman categories in contemporary legal scholarship. In line with contemporary methodological trends in the social and legal sciences, the study is based on the premise that interdisciplinary research and historical analysis are indispensable tools for critically reinterpreting existing legal institutions and understanding their deepest conceptual foundations (Barros & Bores, 2024; Cárdenas-Palomino et al., 2024).

Since the 6th century B.C.: opposition between forms of government distinguished by the respective regimes of action of the People.

The identification of the fundamental question regarding the mode of action of collective units finds one of its most significant precedents in the political tradition of classical antiquity. The search for the best form of government was a constant concern in ancient Mediterranean thought and was explicitly articulated by Herodotus in his Histories (III, 80–82), where he presents the debate regarding the relative advantages of democracy, aristocracy, and monarchy. Beyond the classical tripartite classification, the methodological value of this passage lies in having shifted the analysis from the object of governmental action toward the identification of the subject legitimized to exercise it.

In this context, ancient political thought began to distinguish between two structurally diverse models of collective organization: one based on the direct action of the body politic and the other grounded in the vicarious action of subjects vested with the authority to decide on behalf of the community. This contrast is central to understanding the subsequent development of Roman republican institutions, as well as the historical persistence of the tension between political participation and representation. As contemporary legal historiography has noted, the Roman republican tradition gave rise to a specific conception of active citizenship that profoundly influenced the formation of Western legal categories (Du Plessis, 2013).

The Roman experience transformed this political reflection into a genuine legal construct. The expulsion of the kings, the consolidation of the res publica, and the gradual identification of the people as the sovereign holder of legislative power represented an institutional innovation of enormous historical significance. The formula later articulated by Pomponius and Gaius according to which the people constitute an exemplary collective unit expresses the existence of a legally organized community capable of expressing its will through its own procedures and not exclusively through intermediaries.

From this perspective, the participatory principle should not be interpreted solely as a historical form of political organization, but rather as a genuine general principle of the Roman legal system. This conception explains why the legitimacy of the law was linked to collective consent expressed through institutionalized mechanisms of deliberation and decision-making. Consequently, citizen participation became a constitutive element of legality itself, a circumstance that substantially distinguishes the Roman republican model from systems based on representation as the exclusive mechanism for the exercise of power.

Various recent studies on historical constitutionalism have highlighted precisely this participatory dimension of Roman law, emphasizing that the republican experience shaped a legal tradition based on the interaction between citizenship, norms, and institutional construction, the effects of which can be traced even in modern formulations of popular sovereignty (Mousourakis, 2014).

The relevance of this conceptual opposition between self-government and government by others transcends the strictly historical realm. In fact, it constitutes one of the fundamental explanatory elements of the configuration of contemporary Western legal systems, as it allows us to understand the existence of normative models built on different assumptions regarding the nature of collective units and the people's effective capacity to act as an autonomous legal subject.

In the 18th Century: A Dialectic Between Opposing Legal and Political Models the English Monarchical/Representative Model and the Roman Republican/Participatory Model.

The 18th century was a decisive period for the reformulation of the legal and political categories inherited from antiquity. In the context of the intellectual transformations associated with the Enlightenment, the question regarding the people's capacity for action resurfaced with renewed intensity, influencing debates surrounding sovereignty, the legitimacy of power, and the institutional organization of the state. The rejection of monarchical absolutism, shared by broad sectors of European thought, fostered the consolidation of two opposing models of political organization: the English model, which was representative and constitutional-monarchical in nature, and the Roman republican model, oriented toward the direct participation of the body politic in the creation of laws and the conduct of public affairs.

The theoretical formulation of the English model finds one of its most influential expressions in the work of Montesquieu. In *De l'esprit des lois* (1748), the author identifies in the English constitution a system based on the functional distribution of power, whose stability depends on the separation of legislative, executive, and judicial functions. However, this structure presupposes a particular conception of the political community, according to which the will of the people must be channeled through representatives endowed with the legitimacy to decide on their behalf. This representative logic, which has its roots in the political theory of Thomas Hobbes, implies a limitation on citizens' direct involvement in the effective exercise of power and establishes a regime of indirect or substitute action (Loughlin, 2010; Skinner, 2018).

In contrast, the republican model developed during the 18th century championed the Roman legal tradition as a paradigm of collective self-government. Jean-Jacques Rousseau, particularly in *Du contrat social* (1762), posited that sovereignty belongs essentially to the people and that its exercise cannot be delegated without compromising the very essence of the general will. From this perspective, the body politic is conceived as a moral and collective community capable of acting on its own through institutional mechanisms that guarantee the active participation of its members. Public authority is not understood as a substitute for the popular will, but rather as a function subordinate to the mandate emanating from the citizenry as a whole.

The legal reception of this republican model found one of its most significant expressions in the Code Civil des Français of 1804. Considered by numerous authors to be a true civil constitution of modern society, the Napoleonic Code preserved fundamental elements of the Romanist tradition, especially with regard to private autonomy, the centrality of the legal subject, and the persistence of conceptual categories derived from Roman legal experience. In this sense, the 1804 Code can be interpreted as the normative crystallization of a legal model built upon the capacity for action of political communities and upon the historical continuity of republican thought (Halpérin, 2021).

The opposition between these two models transcended the strictly institutional level to extend to the very understanding of law as a system. While the representative paradigm tended to conceive of legal legitimacy as the result of the actions of specialized organs of power, the republican paradigm upheld the classical idea that law constitutes an immediate expression of organized collective will. This theoretical divergence largely explains the subsequent tensions between the continental and Anglo-Saxon legal traditions, as well as contemporary debates regarding citizen participation, deliberative democracy, and the limits of political representation.

Various recent studies in comparative law and constitutional theory have highlighted that the contrast between participation and representation remains one of the main analytical frameworks for understanding the evolution of modern institutions and the persistence of distinct legal models within the Western tradition (Samuel, 2014; Bell, 2001).

Since the 19th Century: The Pandectistic Construction of the Romano-Germanic System

The legal thought that developed in Germany during the 19th century brought about one of the most profound conceptual transformations in the history of the Romanist tradition. Beyond the technical refinement of the categories of private law, the Historical School and Pandectism introduced a new conception of the legal nature of collective entities, including the People and the State. This process involved the gradual abandonment of the Roman republican paradigm based on the capacity of political communities to act directly and its replacement with a theoretical framework centered on representation as an indispensable mechanism for legal action. Consequently, collective entities began to be conceived as abstract subjects, lacking their own will and in need of representative bodies to legally express a will that was considered nonexistent in natural terms (Stein, 1999; Zimmermann, 1996).

The systematic formulation of this doctrine can be found primarily in the work of Friedrich Carl von Savigny, particularly in *System des heutigen römischen Rechts*, where legal personality is defined as a creation of the legal system intended to confer capacity on entities that, on their own, would lack physical existence. Subsequently, Bernhard Windscheid developed these categories within pandectist thought, consolidating an abstract conception of legal persons that would ultimately exert a decisive influence on German codification. Added to this was Paul Laband's significant contribution regarding representation, conceived as a legal technique necessary to compensate for the inability of collective units to act on their own. Thus, the participatory system characteristic of the Roman republican model was replaced by a representative system whose legitimacy rested on dogmatic assumptions distinct from those of the classical tradition (Wieacker, 1995).

The historical significance of this conceptual shift lies in the fact that it allowed for a retrospective reinterpretation of Roman law through categories foreign to its original experience. The idea that every collective constitutes a legal fiction incapable of acting on its own profoundly transformed the understanding of Roman institutions and facilitated the construction of a new legal system later identified as "Roman-Germanic." This system retained much of the terminology of Roman law but substantially modified its political and philosophical foundations, attributing to it structural principles that originally belonged to representative models of the monarchical tradition. Thus, the historical memory of Republican Roman law was gradually supplanted by a systematic interpretation developed from the German legal experience of the nineteenth century (Koschaker, 1955; Schiavone, 2012).

The normative crystallization of this new paradigm occurred with the entry into force of the Bürgerliches Gesetzbuch on January 1, 1900. The BGB represented the culmination of the pandectist process and constituted a highly systematized model of codification, characterized by a high level of conceptual abstraction and by the central role attributed to legal representation. Its influence quickly transcended European borders and helped consolidate a new identity for continental law, shaping what comparative legal doctrine would later call the Romano-Germanic family. Consequently, the nineteenth century not only transformed the technical categories of private law but also redefined the very foundations of the Western legal system (Glendon, Gordon & Osakwe, 1994; Reimann & Zimmermann, 2019).

Likewise, various contemporary studies have noted that this doctrinal reconstruction of collective personality continues to exert a significant influence on current theories of the state, political representation, and democratic legitimacy. The persistence of these categories demonstrates that the conceptual framework developed by nineteenth-century German legal scholarship was not merely a historical phenomenon, but a genuine, long-lasting reconfiguration of the modern understanding of law and public institutions (Cairns, 2015).

The Latin American Reception of the Romano-Germanic System

The reception of German pandectist doctrine quickly transcended European borders and gained global prominence during the second half of the 19th century. Particularly in Latin America, the codification process unfolded within an intellectual context marked by the simultaneous influence of the Code Napoléon and German legal scholarship. However, even before the Bürgerliches Gesetzbuch came into force in 1900, numerous Latin American jurists had already incorporated categories characteristic of the pandectist conception of legal persons and representation, anticipating the consolidation of a legal system later identified by comparative legal doctrine as "Roman-Germanic." This early reception demonstrates that the circulation of legal ideas was driven less by a chronology of legislation than by a particularly intense dynamic of doctrinal and academic exchange (Duve, 2018).

Figures such as Andrés Bello, Augusto Teixeira de Freitas, and Dalmacio Vélez Sarsfield played a fundamental role in this process. Although their works were produced in diverse historical contexts, they share the progressive incorporation of categories linked to abstract legal personality and representation as the exclusive mechanism for the action of collective entities. The wording of Article 35 of the Argentine Civil Code of 1869 constitutes a paradigmatic example of this trend. The explicit reference to Savigny and the equating of the legal person with an incapacitated subject whose will must necessarily be expressed through representatives demonstrates the depth to which pandectist categories were assimilated by Latin American codification. From this perspective, the reception of German legal thought entailed not only the adoption of technical solutions in private law but also the incorporation of theoretical assumptions regarding the nature of the state, the people, and collective action (Zimmermann, 1996; Guzmán Brito, 2000).

However, the expansion of this new legal paradigm coexisted with currents of political thought that continued to advocate for participatory models of social and state organization. In 19th-century Ibero-America, discourses persisted that emphasized the centrality of local communities, municipalities, and forms of citizen participation as legitimate expressions of self-government. The work of José Martí constitutes a particularly significant manifestation of this tradition, as it draws on the Roman municipal experience as a historical reference point for the construction of an active citizenry committed to public affairs. Such approaches suggest that the adoption of the representative model did not completely erase the historical memory of the Roman republican

paradigm, but rather generated a conflictual coexistence between these two conceptions of collective action (Agüero, 2013).

Another element of great relevance for understanding the consolidation of the new Roman-Germanic legal system lies in the parallel development of political doctrines that questioned the importance of legal constructs in explaining historical processes. The Marxist thesis regarding the superstructural nature of law indirectly contributed to the displacement from intellectual debate of discussions concerning the institutional configuration of power and the mode of operation of collective units. Consequently, the categories developed by nineteenth-century German legal scholarship remained relatively unchallenged for long periods, fostering their acceptance as virtually indisputable conceptual frameworks within contemporary legal culture. This phenomenon partly explains the extraordinary stability achieved by the representative paradigm during the nineteenth and twentieth centuries (Mattei, 1997).

From the perspective of comparative law, the consolidation of the so-called Romano-Germanic system represented one of the most significant processes of legal homogenization in modern times. Contemporary legal scholarship has noted that the extraordinary spread of this model stemmed both from its technical merits and from its ability to offer a coherent and systematic conceptual framework capable of being adapted to highly diverse national contexts. However, this success also resulted in the gradual marginalization of other interpretive traditions of Roman law, particularly those linked to the participatory and republican paradigm that characterized much of the classical legal experience (Glendon, Gordon & Osakwe, 1994; Samuel, 2014).

Conclusions

The contemporary interpretation of law, in both its public and private dimensions, continues to be shaped by the conceptual categories developed during the nineteenth century by German legal scholarship. The consolidation of the doctrine regarding the legal incapacity of collective entities and the consequent widespread adoption of the representative system brought about a profound transformation in the historical understanding of Roman law. In fact, the legal system currently identified as "Roman-Germanic" is, to a large extent, the result of a modern doctrinal reworking that progressively replaced the participatory principle characteristic of the republican tradition with a paradigm centered on representation and the indirect action of political communities.

The virtually universal acceptance of this theoretical construct contributed to the interruption of a centuries-long reflection on the mode of action of the People and other collective units. From classical antiquity through the political transformations of the 18th century, the question of who should exercise power remained open and was the subject of ongoing philosophical, legal, and constitutional debates. However, the elevation of representation to the status of the sole possible form of collective action significantly reduced the space for discussion of alternative models of political and legal organization. As a result, the distinction between self-government and government by others ceased to be a central issue for contemporary legal theory, despite the historical significance it had held in the shaping of Western institutions.

To this must be added that the gradual shift of legal reflection toward predominantly economic or functionalist approaches has also failed to bridge the theoretical gap created by the abandonment of that fundamental question. On the contrary, various authors have pointed out that replacing the question of who legitimately exercises power with questions exclusively linked to the efficiency of public decisions has contributed to deepening the analytical limitations of contemporary legal science. In this regard, the revival of a historical perspective capable of

integrating legal, political, and institutional dimensions appears to be a necessary condition for critically rethinking the categories currently in use.

From this perspective, the methodological proposal of addressing general problems of law through the study of Roman law takes on renewed relevance. Far from being a merely scholarly exercise, the return to Roman sources allows us to recover alternative historical experiences, reconstruct forgotten conceptual categories, and reopen discussions that were closed off by nineteenth-century doctrinal elaborations. The legacy of the Roman Republican legal model thus offers the possibility of reconsidering collective participation not as a historical exception, but as one of the structural principles that for centuries guided the construction of Western legal institutions.

Consequently, the revival of the participatory tradition of Roman law does not entail a mere historiographical reclamation, but rather the opening up of new avenues of reflection for contemporary legal theory. Understanding Roman law as a system grounded in the general principle of participation allows us to challenge the apparent inevitability of the representative paradigm and fosters the reconstruction of a legal science that is more aware of its own historical assumptions. In this sense, the study of Roman law continues to offer indispensable tools for critically rethinking the foundations of the contemporary legal system and for helping to break the deadlock in ongoing debates surrounding legitimacy, democracy, and collective action.

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Translation and Analysis of the Gregorian and Hermogenian Codes for a Better Understanding of the Law

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Introduction

The evolution of Roman law constitutes one of the most influential historical processes in shaping the Western legal tradition, not only because of the richness of its institutions but also because of the enduring capacity for adaptation it demonstrated in the face of the political, social, and administrative transformations of the Roman Empire. From its earliest customary manifestations to the consolidation of major legislative compilations, the Roman legal system underwent a continuous process of systematization aimed at preserving legal certainty and ensuring the uniform application of the law across an increasingly vast and diverse territory. In this context, legal compilations were not merely an effort to collect legal provisions, but also an exercise in refinement, organization, and interpretation intended to ensure the validity and coherence of the legal system (Watson, 1998; Honoré, 1994).

The need to organize the abundant body of legal material became particularly evident during the Late Empire, when the coexistence of classical jurisprudential rulings (iura) and imperial constitutions (leges) created a complex web of legal provisions that made it difficult to identify the law in force. The accumulation of rescripts, decrees, edicts, and judicial opinions led to growing legal uncertainty for both magistrates and legal practitioners, a circumstance that spurred the development of various pre-Justinian compilations aimed at systematizing legal knowledge and facilitating its practical application. This process would culminate decades later with the compilation of Justinian's *Corpus Iuris Civilis*, considered the most important work of legal codification in Late Antiquity (Kunkel, 1973; Harries, 1999).

Within this historical process, the Gregorian Code and the Hermogenian Code compiled approximately toward the end of the third century and the beginning of the fourth century A.D. occupy a particularly significant place. Both constitute the first private compilations of imperial constitutions and represent the starting point of the codification movement that would later be continued by the Law of Citations, the Theodosian Code, and, finally, the Justinian compilation. Although their complete texts have not survived to the present day, the reconstruction of numerous fragments preserved in later compilations has made it possible to recognize their enormous importance for understanding the evolution of postclassical Roman law and the transition toward the major imperial codifications (Corcoran, 2013; Sirks, 2025).

The study of these sources takes on even greater importance because much of their content remained accessible for centuries only through partial reconstructions based on scattered quotations preserved in the Romano-Barbarian laws, the *Breviarium Alaricianum*, the *Corpus Iuris Civilis*, and other legal compilations. This circumstance has considerably limited their use by Spanish-speaking researchers and students, especially in Latin America, where critical translations of both codices are scarce and, in some cases, outdated. Consequently, the translation and systematic analysis of these sources not only contribute to expanding historical knowledge of Roman law but also facilitate new lines of research on the reception of its institutions in contemporary legal systems.

From the methodological perspective of legal research, the recovery, translation, and critical analysis of primary sources constitute an essential activity for strengthening the scientific development of the social sciences. Documentary research allows for the reconstruction of the historical processes that gave rise to current legal institutions and fosters the production of new knowledge through the rigorous examination of original sources, thereby contributing to the consolidation of research grounded in history and legal doctrine (Barros & Bores, 2024). Similarly, the creation and dissemination of up-to-date academic materials strengthen higher education processes, promote critical thinking, and facilitate access for faculty and researchers to specialized sources that enrich legal education and research (Cárdenas-Palomino et al., 2024).

This study is based on these premises, and its purpose is to analyze the role played by the Gregorian and Hermogenian Codes within the pre-Justinian compilation process, highlighting their historical context, their normative structure, and their subsequent influence on the Corpus Iuris Civilis. At the same time, the study examines the importance of their translation into Spanish as a means of facilitating access to these sources for the academic community and of evaluating the reception of various Roman legal institutions in contemporary Argentine law. In this regard, the research is not limited to a philological exercise in translation but incorporates a historical-legal analysis aimed at establishing the continuity of certain Roman institutions within the modern legal tradition, highlighting the enduring nature of principles and institutions whose influence continues to shape legal systems of the Romano-Germanic tradition.

Finally, the study demonstrates that the pre-Justinian compilation constitutes an indispensable link for understanding the evolution of Roman law between classical jurisprudence and Justinian codification. A systematic study of the Gregorian and Hermogenian Codes allows us to appreciate not only the process of legal codification that took place during the Late Empire but also the extraordinary historical continuity of Roman legal thought, whose influence remains evident in numerous institutions of contemporary private law and, in particular, in the historical development of Argentine law. From this perspective, this research aims to provide new insights into the study of Roman legal sources and to contribute to the strengthening of Roman law as an indispensable discipline for understanding current law.

The Pre-Justinian Compilation: Historical Context and the Need for Legal Systematization

The evolution of Roman law during the 3rd and 4th centuries A.D. was marked by profound political, administrative, and social transformations that directly affected the Empire's legislative output. The progressive strengthening of imperial power altered the classical system of law-making, gradually shifting the central role from case law to imperial constitutions as the primary source of law. This change led to a constant accumulation of rescripts, decrees, mandates, and edicts issued by the emperors, whose coexistence with the abundant classical jurisprudential legacy ultimately resulted in a legal system that was complex, fragmented, and, in many respects, difficult to apply in practice (Kunkel, 1973; Honoré, 1994).

While during the classical period the interpretations of the great jurists had allowed for a certain balance between doctrinal development and legislative activity, in the Late Empire the increase in imperial decisions generated a multitude of provisions that became increasingly difficult for judges, officials, and private individuals to consult. The coexistence of the iura comprising the opinions of classical jurists with the leges represented by imperial constitutions gave rise to frequent contradictions, interpretive problems, and difficulties in determining which law was actually in force. This situation directly undermined the principle of legal certainty, as the absence

of a systematic organization fostered divergent interpretations and inconsistent judicial decisions (Harries, 1999; Corcoran, 2013).

Faced with this scenario, the need arose to develop compilation mechanisms capable of organizing the immense volume of imperial provisions accumulated over several centuries. Legal compilation thus responded to an eminently practical need: to facilitate knowledge of the law in force, eliminate normative contradictions, and provide legal practitioners with tools that would allow for the uniform application of legislation. This phenomenon was not an isolated event but rather an institutional response to the Empire's growing administrative complexity and to the need to strengthen the authority of the central government by unifying the legal system (Sirks, 2025).

It was in this context that the Gregorian Code and the Hermogenian Code appeared, considered the first systematic compilations of imperial constitutions from the postclassical period. Although produced through private initiative rather than by official promulgation, both codes acquired considerable practical authority due to their usefulness as references for current imperial decisions. The Gregorian Code primarily compiled constitutions enacted from the reign of Hadrian through that of Diocletian, while the Hermogenian Code supplemented this compilation by incorporating new constitutions issued primarily during the reign of Diocletian. In this way, both texts served as an immediate precursor to the later codification movement that would culminate in the Theodosian Code and, ultimately, in Justinian's Corpus Iuris Civilis (Corcoran, 2013; Watson, 1998).

The significance of these compilations extends beyond mere historical interest. Their creation represented the first successful attempt to systematically organize a body of legislation that, until then, had remained scattered across countless imperial documents. Furthermore, they established a methodological model that would be adopted and refined by subsequent official compilations, consolidating a legislative technique based on the thematic classification of constitutions and the progressive refinement of normative material. From this perspective, the pre-Justinian compilation can be understood as an indispensable intermediate stage between classical case law and the great Justinian codification, serving as the bridge that made it possible to preserve a significant portion of the Roman legal heritage for subsequent generations (Ando, 2011).

The historical significance of this process also lies in the fact that it allowed for the indirect preservation of numerous legal institutions that would otherwise have been lost with the physical disappearance of the original texts. Although the Gregorian and Hermogenian Codes have not survived in their entirety to the present day, their fragments were later incorporated into the Theodosian Code, the Corpus Iuris Civilis, the Romano-Barbarian laws, and other medieval legal compilations a circumstance that has made it possible to partially reconstruct their content and assess their influence on the evolution of continental European law (Metzger, 1997).

From a historiographical perspective, the pre-Justinian compilation also bears witness to the transition between two distinct conceptions of law. While the classical period was characterized by the predominance of jurisprudential creation and the casuistic development of legal solutions, the Late Empire consolidated a trend toward normative centralization and the legislative authority of the emperor. This transition explains why legal compilations gained increasing importance, eventually becoming the fundamental instrument for ensuring the stability of the legal system and preserving the continuity of Roman legal thought. Consequently, understanding the origin and purpose of the Gregorian and Hermogenian Codes is essential for

explaining the evolution of the Roman legal system and its subsequent influence on modern codifications, particularly those belonging to the Romano-Germanic tradition.

The Translation of the Gregorian and Hermogenian Codes as a Scholarly Contribution to the Study of Roman Law

The study of sources constitutes one of the fundamental pillars of Roman law research. Knowledge of Roman law depends, to a large extent, on the ability to access the original legal texts directly, understand their historical context, and properly interpret the scope of the institutions they regulate. Consequently, the critical translation of the Gregorian and Hermogenian Codes represents a particularly significant contribution to contemporary legal research, as it facilitates access to documents whose consultation had previously been limited by the absence of updated versions in Spanish and by the fragmentation of the preserved material (Watson, 1998; Corcoran, 2013).

The importance of this project lies in the fact that both codes constitute the starting point of the codification movement that developed during the Late Roman Empire. Although legal scholarship has widely recognized their significance as the immediate precursors to the Corpus Iuris Civilis, much of their content remained scattered across partial reconstructions based on quotations preserved in later compilations a circumstance that hindered the systematic study of their provisions and limited the ability to accurately assess their influence on the evolution of Western law. The lack of a recent Spanish translation, particularly within the Argentine legal sphere, justified the need to undertake a research project that would allow for the reconstruction, translation, and legal analysis of both bodies of law.

To achieve this goal, the research relied primarily on the critical edition prepared by Paul Krueger in *Collectio Librorum Iuris Anteiustiniani*, considered by legal scholars to be one of the most well-established reconstructions of the preserved fragments of both codes. Concurrently, the study was cross-referenced with the edition by Gustav Haenel, allowing for a comparison of textual variants and enhancing the accuracy of the translation. Although neither of these works preserves the original content of the codes in its entirety, both bring together the fragments transmitted by the Roman-Barbarian laws, the Justinian compilations, and other later legal sources a circumstance that makes it possible to reconstruct the structure and content of these pre-Justinian compilations with a high degree of reliability (Krueger, 1890; Haenel, 1857).

The general objectives of the project were designed to address both a scientific need and an academic purpose. First, the project set out to produce a rigorous translation of the Gregorian Code and the Hermogenian Code into Spanish, striving to preserve the original legal meaning of the imperial constitutions. Second, the plan was to conduct a systematic analysis of the translated texts by comparing them with the principal sources of Roman law and with certain institutions present in the Argentine legal system. Finally, the research sought to provide the academic community with a reference tool to facilitate future research, teaching activities, and specialized studies on the evolution of Roman law

In accordance with these general objectives, the research established the following specific goals: to determine the historical context that led to the drafting of both codes; to assess the extent to which they were incorporated into the Justinian Code; to identify the main legal matters regulated in their constitutions; and to analyze the possible influence that these legal institutions exerted, directly or indirectly, on the development of Argentine law. These objectives made it possible to structure a study that goes beyond a simple documentary translation to become a

historical-comparative study aimed at identifying the continuity of certain legal institutions over the centuries.

The project's central hypothesis stemmed from the observation of a significant gap in the literature within the Spanish-speaking legal sphere. It was considered that the lack of an up-to-date Spanish translation of both codes hindered the systematic study of Roman sources and limited the understanding of numerous legal institutions later incorporated into the Corpus Iuris Civilis. Consequently, it was argued that the production of a critical translation accompanied by a legal analysis would facilitate access to these sources, improve their historical understanding, and help determine the degree of influence these compilations have exerted on contemporary Argentine law.

From a methodological standpoint, the research adopted a strategy typical of historical-legal studies conducted on Roman sources. Exegetical, historical, and analytical methods were combined to interpret the imperial constitutions within their normative and political context, complementing them with abductive reasoning that allowed for the formulation of inferences regarding the evolution of certain legal institutions and their subsequent reception in the Justinian compilations and in modern law. The combined use of these methods addressed the specific characteristics of Roman law, whose jurisprudential construction requires interpreting the sources by considering both the historical context and the doctrinal evolution of each institution (Bretone, 1995; Fernández de Buján, 2006).

The project was carried out in several stages, some of which were conducted successively and others simultaneously. These included the translation of the preserved fragments of both codices, the compilation and classification of specialized bibliography, the historical contextualization of the compilations within the evolution of Roman law, the thematic analysis of the imperial constitutions, the determination of their incorporation into the Corpus Iuris Civilis, and the examination of the possible reception of various legal institutions in Argentine law. This methodology made it possible to integrate the philological study of the texts with a historical and dogmatic analysis of their main contents, thereby strengthening the scientific rigor of the research.

Finally, the project incorporated a significant dimension of academic outreach. During the two years of research, the progress made was disseminated through the presentation of scholarly papers and specialized publications, allowing the results to be subjected to academic debate prior to the preparation of the final report. This strategy facilitated the progressive refinement of the research and demonstrated that the translation of the Gregorian and Hermogenian Codes constitutes not only a documentary contribution but also a tool designed to strengthen teaching, research, and the comparative study of sources of Roman law in the contemporary university setting (Barros & Bores, 2024; Cárdenas-Palomino et al., 2024).

Main Legal Contributions of the Gregorian and Hermogenian Codes and Their Impact on Contemporary Law

The translation and systematic analysis of the Gregorian and Hermogenian Codes made it possible to identify a set of legal institutions whose importance transcends the historical sphere of Roman law and exerts an influence on various contemporary legal systems. Far from being merely compilations of imperial constitutions, both codes reflect the evolution of numerous institutions of private, procedural, and property law, many of which were later incorporated into

the Corpus Iuris Civilis and, through the Romanistic tradition, found significant reception in modern civil codifications.

One of the first areas analyzed concerns the regulation of the legal capacity of minors. The surviving fragments of the Gregorian Code reveal the Roman legislator's concern to prevent the abusive exercise of the protective mechanisms granted to those who had not yet attained full legal capacity. In particular, the imperial constitutions penalized cases in which a minor deliberately concealed his or her age to enter into legal transactions and subsequently sought to invoke his or her minority to nullify the effects of his or her own acts. The solution adopted by Roman law reveals an early concern for preserving good faith in legal relationships and preventing fraudulent conduct that would undermine the security of legal transactions. From a comparative perspective, this regulation highlights important precursors to principles currently associated with objective good faith, the protection of legitimate expectations, and the responsible exercise of rights institutions that remain present in contemporary private law.

Another particularly relevant aspect concerns the regulation of the action for recovery of property and the regime of accession. An analysis of the imperial constitutions confirmed the consolidation of classical principles regarding the incorporation of structures and plantings into the land, as well as the rules applicable to the reimbursement of expenses incurred by possessors acting in good or bad faith. These provisions demonstrate the development of legal criteria designed to balance the protection of property rights with the equity derived from improvements made to another's property. The solution developed by Roman case law extended far beyond the historical context of its formulation and was subsequently incorporated into both Justinian law and numerous civil codes of the Romano-Germanic tradition, including Argentine law.

Equally important is the regulation of legal representation through the figure of the judicial attorney. A study of the provisions of the Gregorian Code revealed rules that precisely defined the scope of the powers conferred on the representative, clearly distinguishing between authorization to intervene in a proceeding and the specific power to enter into settlements. The absence of express authorization prevented the procurator from compromising the substantive interests of the represented party through settlement agreements, thereby reaffirming the principle of the specificity of the mandate. This legal criterion demonstrates the high degree of development achieved by Roman law in the area of representation and explains the persistence of similar rules in various modern civil legal systems, where express authorization continues to be required for certain acts of disposition of property.

The research also made it possible to examine various provisions concerning liability arising from private crimes and its transmission to heirs. A comparative analysis of these provisions revealed that Roman law clearly distinguished between strictly criminal liability which is personal and non-transferable and the obligation to return financial gains obtained through unlawful acts when such gains had become part of the estate. Thus, although criminal liability ceased upon the offender's death, the obligation to return whatever had unjustly enriched the heirs remained, thereby preventing enrichment resulting from an unlawful act. This principle serves as a precursor to contemporary institutions related to financial liability and the restitution of benefits obtained without legitimate cause.

Another particularly significant outcome relates to the regulation of property relations within the Roman family. The study of the so-called Macedonian Senate Consultum provided insight into the evolution of financial liability arising from obligations assumed by children subject to patria potestas. The imperial constitutions examined define the circumstances under which the paterfamilias was liable for the financial obligations incurred by his son, especially when such

resources were intended to meet needs consistent with the family's duty of support, such as intellectual education. These provisions reflect the gradual relaxation of the rigid family property system characteristic of archaic Roman law and demonstrate the evolution of mechanisms designed to protect both family authority and the security of economic relationships.

The research also addressed various rules concerning the payment of obligations and the evidence thereof, finding that Roman jurists gave precedence to the actual fulfillment of the obligation over the mere physical preservation of the documents evidencing the debt. The constitutions analyzed recognized that the creditor's continued possession of the debt instrument did not in and of itself negate the existence of payment when it could be demonstrated by other means of proof. This conception reveals a particularly advanced understanding of the evidentiary process, oriented toward prioritizing substantive truth over excessive documentary formalism a principle that continues to inspire a significant portion of contemporary procedural systems.

Taken together, the findings allow us to affirm that the Gregorian and Hermogenian Codes not only constitute immediate precursors to the Justinian compilation but also represent valuable testimony to the evolutionary process of numerous legal institutions whose influence extended to continental European law and, subsequently, to Latin American legal systems. The systematic translation of these sources made it possible to verify the historical continuity of fundamental principles related to good faith, agency, financial liability, property, obligations, and the protection of the legally incapacitated, confirming that a large part of the solutions developed by Roman jurists retain remarkable doctrinal relevance in modern private law.

Discussion: The Relevance of the Gregorian and Hermogenian Codes as Sources for the Reconstruction of Roman Law and Their Influence on Modern Law

The analysis presented here supports the conclusion that the Gregorian and Hermogenian Codes constitute much more than mere compilations of imperial constitutions. Both represent the first systematic effort to organize the law in force during the Late Empire and demonstrate the transition from a legal tradition based primarily on case law to a model characterized by the growing legislative centralization of imperial power. This circumstance explains why these compilations served as the foundation for subsequent codifications and, in particular, for the drafting of the Corpus Iuris Civilis, becoming an indispensable link in the historical evolution of Roman law (Corcoran, 2013; Watson, 1998).

The findings of this research confirm that, even though the original texts have not been preserved in their entirety, the reconstructed fragments clearly reveal the continuity of numerous legal institutions that were later incorporated into Justinian law. The overlap between various constitutions contained in the pre-Justinian codices and those compiled by Justinian demonstrates that these texts not only served as source material for the imperial compilation but also played a decisive role in preserving the classical legal legacy for future generations. Consequently, the translation and systematic analysis of both codices allow for a more precise understanding of the process by which certain legal solutions survived the political transformation of the Empire and remained in force for centuries.

From a methodological perspective, this research highlights the enduring importance of the direct study of sources in Roman law scholarship. The critical translation of legal documents is

not merely a philological exercise but an indispensable tool for reconstructing Roman legal thought, identifying the evolution of its institutions, and avoiding interpretations based exclusively on secondary doctrinal references. In this regard, the research demonstrates that direct access to sources remains one of the fundamental pillars of historical legal scholarship and a necessary condition for the development of rigorous comparative studies (Fernández de Buján, 2006; Bretone, 1995).

Furthermore, this work confirms the influence that the institutions regulated by both codes exerted on the development of contemporary private law. The principles relating to good faith, the protection of property, legal representation, financial liability, legal capacity, and the law of obligations exhibit a historical continuity that helps explain their subsequent reception within the Romano-Germanic legal tradition and, in particular, in Argentine law. This continuity demonstrates that the value of Roman law lies not only in its historical significance but also in its ability to provide doctrinal categories that continue to guide the interpretation of numerous legal institutions in current law.

The academic value of this translation should also be highlighted. The lack of recent Spanish-language versions of the Gregorian and Hermogenian Codes had been a limitation for legal education and research in the Spanish-speaking world. The production of a new translation accompanied by a systematic study significantly expands the possibilities for research, facilitates access to sources traditionally reserved for specialists, and provides reference material that can serve as a basis for future research on pre-Justinian compilation, Justinian codification, and the reception of Roman law in modern legal systems.

Finally, the research highlights that the process of legal compilation initiated during the Late Empire should not be understood solely as an activity of compiling legal norms. On the contrary, it constituted a mechanism for preserving legal knowledge that made it possible to transmit much of the experience accumulated by Roman jurisprudence to subsequent codifications. Thanks to this process, it was possible to preserve principles and institutions that, with the adaptations characteristic of each era, continue to form part of the Western legal heritage. Consequently, the study of the Gregorian and Hermogenian Codes not only contributes to the historical understanding of Roman law but also strengthens our comprehension of the foundations upon which much of contemporary private law was built and opens new avenues of research aimed at deepening the study of pre-Justinian compilation and its influence on the continental legal tradition.

Conclusion

This research has demonstrated that the Gregorian and Hermogenian Codes constitute a fundamental milestone in the evolution of Roman legal compilation, as they represent the first systematic effort to organize the imperial constitutions during the pre-Justinian period. Their study confirms that both compilations played a decisive role in preserving the law in force and paved the way for the subsequent development of the Corpus Iuris Civilis, consolidating a process of legal systematization that profoundly shaped the Western legal tradition.

The translation and analysis of the surviving fragments have helped overcome a significant limitation in the Spanish-speaking academic community, providing an accessible version that facilitates the direct study of these sources. This contribution strengthens Roman law research, promotes the teaching of Roman law, and offers new tools for understanding the historical evolution of numerous legal institutions that remain present in contemporary legal systems.

The study demonstrated that the Gregorian and Hermogenian Codes contain provisions on matters of private law, procedural law, and property law whose influence extended beyond the historical context in which they were drafted. Institutions related to legal capacity, legal representation, property protection, financial liability, obligations, and family relationships demonstrate a legal continuity that explains their subsequent incorporation into Justinian law and their reception in various systems of the Romano-Germanic tradition, including Argentine law.

Furthermore, the research confirmed that a methodology based on the direct analysis of historical sources is an indispensable tool for reconstructing the evolution of Roman legal thought. The combination of philological, historical, and dogmatic study made it possible to interpret the imperial constitutions within their original context and to establish with greater precision the connections between the pre-Justinian compilation, Justinian's work, and the subsequent development of modern private law.

Finally, the results obtained confirm that the objectives and hypotheses set forth were fully achieved. The translation, the systematization of the texts, and the identification of the influence exerted by both codices on the Justinian compilation and certain institutions of Argentine law demonstrate the scientific relevance of these sources and open new lines of research aimed at deepening our understanding of the pre-Justinian period and its contribution to the formation of the continental legal tradition.

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Financial and Revenue-Generating Capacity at the Local Level: An Analysis of Small Municipalities in Ecuador from a Latin Municipalist Perspective

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Introduction

The financial sustainability of local governments is one of the main challenges for managing territorial development in decentralized economies. In the case of Ecuador, this issue takes on particular significance in municipalities with smaller populations, where structural limitations in the local economic base restrict the generation of their own revenue. This situation is particularly significant when one considers that, according to the Ecuadorian constitutional framework, Decentralized Autonomous Governments (GADs) must ensure the provision of public goods and services, promote local development, and implement investment projects that contribute to the well-being of the population (Assembly of Ecuador, 2008) .

In this context, the question arises: What are the characteristics and limitations of revenue-raising capacity that affect the financial sustainability of Ecuadorian municipalities with fewer than 50,000 inhabitants? The results, based on a sample of 26 Ecuadorian municipalities, reveal a marked dependence on transfers from the central government, which constitute the main source of funding in areas with populations of fewer than 50,000.

At the same time, significant gaps in the management of local revenues have been identified, reflected in the low share of municipal taxes within the budget structure, as well as in institutional limitations related to property assessment updates, tax enforcement mechanisms, debt collection, and the modernization of revenue collection processes.

The experience and role of municipal finance directors make it possible to identify strengths, limitations, and opportunities associated with the revenue-collection capacity and financial sustainability of Ecuadorian municipalities with smaller populations.

In this regard, applied research in public administration takes on special relevance when it provides evidence that helps understand the limitations and potential of local jurisdictions, thereby facilitating decision-making oriented toward sustainable development.

As Álava (Álava Alcívar, 2021) points out, the production of knowledge must go beyond the mere description of phenomena to contribute to an understanding of the specific problems faced by local organizations and actors, generating inputs that support processes of institutional improvement and transformation. From this perspective, the analysis of municipal revenue-raising capacity and financial sustainability is not only a technical exercise in fiscal evaluation but also a tool for strengthening the autonomy of local governments and improving their ability to respond to the challenges of territorial development.

Traditional Revenues in Municipal Finance

At the local level, territorial planning is conditioned by the availability of financial, human, and material resources. Without an adequate allocation of these resources, territorial plans can hardly

be translated into projects, public works, or public policies that meet the needs of the population.

In the words of Antonio Ocampo, former executive secretary of the Economic Commission for Latin America and the Caribbean: "It is ineffective if local governments do not have the economic resources allocated to the fulfillment of their objectives" .

However, local governments have revenue derived from three fundamental sources for their finances: 1) transfers derived from shares or allocations from the central or federal government, 2) own-source revenue generated by municipal administration; and 3**)** locally levied taxes (Villalobos, 2022) . Among these, the marked dependence on transfers from the central or federal government as the primary source of revenue stands out (Rojo, 2025) , a situation that, to varying degrees, constrains municipalities' management capacity and reduces incentives for efficient management, accountability, and fiscal responsibility (Radics, Vázquez, & Ruelas, 2022) .

In this context, Marcela Paz(2022) , in her analysis of municipal revenues, advocates for the development of financial alternatives that contribute to the sustainable strengthening of municipalities, specifically in the management of their own revenues. The researcher emphasizes the need to implement innovative measures within these traditional financing frameworks, with the aim of diversifying revenue sources and expanding economic autonomy.

Furthermore, she highlights the importance of strengthening institutional capacities, recognizing human talent as a strategic factor for improving performance. Consequently, it is essential to promote ongoing training programs for municipal staff in areas such as financial management, budget planning, project development, revenue collection, and the use of information technology (Quiñónez & Menéndez, 2026) . These competencies not only contribute to increased administrative efficiency but also foster the generation and sustainability of resources allocated to territorial development (Paz, 2022) .

At the municipal level, tax revenues constitute an essential source of self-generated revenue and are governed by country-specific regulations. Regarding the classification of taxes, the prevailing view both in Latin America and Europe favors a three-part system: taxes, fees, and contributions (Olano, 2025) .

However, Latin America's tax collection dynamics need improvement. The cases of Argentina and Brazil confirm regional patterns of low compliance among citizens regarding the payment of municipal taxes.

In Argentina, there is resistance to paying direct taxes, which has led to the emergence of practices such as tax avoidance, while Brazil faces similar challenges regarding tax evasion (Durán & Torres, 2024) .

These countries have been highlighted because they are major economies in the region, demonstrating that low tax revenues in municipalities are not solely determined by taxpayers' ability to pay but also by factors related to a culture of tax evasion.

There are factors that explain this: Rojas and Barbarán(2021) , in their studies on tax collection management in municipalities, identified confusing and negative opinions among taxpayers regarding the use of the funds collected by municipalities, as well as citizens' lack of awareness of the importance of taxation.

In response to this problem, researchers propose that local governments implement strategies to raise awareness about the proper use of collected funds, as well as impose penalties for noncompliance (Rojas & Barberá, 2021) .

In addition, Anchundia and Aguayo(2024) identify operational limitations that negatively impact the generation of local revenue, including reliance on traditional collection mechanisms, outdated urban and rural land registries, and insufficient notification to taxpayers with outstanding obligations. These findings demonstrate that administrative and technological modernization is a key element in optimizing collection processes, improving the identification of the tax base, and reducing revenue losses resulting from institutional inefficiencies.

Likewise, strengthening local revenue requires expanding the focus to non-tax sources which, according to Cano(2021) , include income from the use of public assets, concessions, royalties, fines, and other economic activities under municipal jurisdiction. The efficient management of these resources allows for the diversification of local funding sources and generates higher levels of fiscal autonomy, helping to reduce the vulnerability caused by excessive dependence on external resources.

This need for strengthening takes on particular relevance in Latin America, where the literature reports a high dependence on government transfers as the primary source of local financing. Studies such as those by Ramírez and Carrillo(2017) show that this situation can limit municipalities' capacity for financial planning and management. Consequently, strengthening own-source revenues through administrative improvements, updating records, diversifying sources, and modernizing collection mechanisms is a necessary condition for consolidating the financial sustainability and autonomy of local governments.

However, the management and strengthening of own-source revenues go beyond the simple collection of taxes and are directly related to the institutional capacity of local governments to administer, control, and diversify their sources of funding. In this regard, municipalities must not only ensure the efficient collection of taxes, fees, and levies but also optimize the use of non-tax revenues derived from the administration of public assets, the provision of services, and other economic activities within their jurisdiction.

Budget Composition and Challenges to Local Financial Sustainability

To examine this reality in the Ecuadorian context, this study compiled information provided by financial directors from 26 municipalities in 21 provinces across the country. These informants were selected based on their direct involvement in budget planning, tax administration, and financial and institut al management processes, which allowed for a technical assessment of the main factors affecting the generation of own-source revenue and municipal financial sustainability.

The analysis was structured around the variable "revenue collection capacity," considering dimensions related to the share of tax revenue, recovery of delinquent accounts, property tax assessment updates, and administrative innovation processes. Complementarily, the variable "financial sustainability" was addressed through indicators associated with dependence on government transfers and perceptions regarding the adequacy of own-source revenue to meet institutional needs. This operationalization made it possible to identify elements that reflect both the strengths and limitations present in municipal financial management.

The challenges analyzed focus on aspects considered strategic by the literature on local public finance and by the study participants themselves. Among these are the ability to increase the share of own-source revenue within the budget structure, the updating of cadastral instruments, the effective recovery of outstanding receivables, and the incorporation of technological mechanisms that contribute to modernizing revenue collection and taxpayer service processes.

Based on these dimensions, the results allow us to characterize the current state of own-revenue management in the municipalities studied and to identify the factors that may be limiting the strengthening of their financial autonomy. Furthermore, they provide empirical evidence on the relationship between revenue-collection capacity and dependence on resources from the central government elements that are essential for understanding the challenges faced by local governments in their pursuit of greater financial sustainability.

As noted by Solleiro and Castañón (2005), cited by Barros and Aburres(2024) , new global trends have brought about significant transformations in organizations, forcing them to develop greater adaptive capacities. From this perspective, strengthening municipalities' own revenue streams requires not only improvements in tax collection but also the incorporation of management tools, up-to-date information systems, and evaluation mechanisms that enable the identification of opportunities for improvement in local financial sustainability.

When classifying municipalities in Ecuador as "small" based on population, 81% of them have fewer than 30,000 inhabitants a condition that results in limited fiscal capacity and restricted possibilities for generating their own revenue.

The results show that 72% of local governments finance more than half of their institutional budget through funds transferred from the National Treasury's Single Account. Within this group, 36% exhibit critical dependence, deriving more than 75% of their budgetary revenue from these transfers, while another 36% show dependence levels between 56% and 75%.

Table 1. *Percentage distribution of municipal dependence on state transfers.*

Share of Transfers in the Municipal Budget	*Percentage of municipalities*
More than 75%	36%
Between 56% and 75%	36%
Between 41% and 55%	12%
Between 16% and 25%	8%
Between 0% and 5%	4%
Total	100%

The situation is exacerbated by the fact that more than 84% of the municipal officials surveyed acknowledge the existence of recurring delays in state transfers. This situation creates liquidity problems, affects budget execution, forces the rescheduling of investments, and hinders the continuity of strategic projects for local development.

As a result, nearly 70% of financial directors perceive that their municipality lacks sufficient economic autonomy to carry out projects.

When analyzing the limited capacity of municipal governments to generate their own revenue, it is necessary to examine the composition of their budget structure, which reveals a low share of tax revenue within institutional financing.

The results show that in 59.2% of the municipalities analyzed, revenue from the three traditional sources taxes, fees, and special improvement contributions does not exceed 15% of the total budget. In contrast, only 11.1% of local governments report that these sources account for more than 40% of their institutional revenue.

Table 2. *Distribution of the share of taxes in municipal budget revenue.*

Share of local tax revenue in the budget	*Percentage of municipalities*
Less than 15%	59.2%
More than 40%	11.1%
Other ranges (16%–40%)	29.7%
Total	100%

However, the analysis shows that although tax revenues do not constitute significant levels for financial autonomy, property taxes and municipal business licenses are considered the most important sources within the structure of own-source revenues. Their importance to local finances reveals significant territorial heterogeneity: 62.9% of finance directors consider these taxes to be a relatively solid revenue source; however, 29.6% hold the opposite view.

This divergence in views highlights that revenue collection capacity does not depend exclusively on the territory's tax potential but also on institutional factors such as cadastral updates, the efficiency of administrative processes, the capacity for tax control and audit, as well as the implementation of effective debt collection mechanisms.

A similar trend is observed in the performance of municipal fees. Although 62.9% of respondents consider them sources of revenue for local government, their role continues to be perceived as complementary rather than strategic within the financial structure. Consequently, fees serve as a source of support for financial management but do not reach sufficient levels to strengthen autonomy.

For their part, special improvement contributions show a lower capacity for consolidation as a mechanism for territorial financing. Only 48.1% of municipalities consider this instrument to make a significant contribution to institutional finances, while 40.7% hold an unfavorable view of it.

This result suggests that special contributions are an underutilized source of revenue. Among the main constraints are the absence of updated regulatory frameworks, limited technical capacity for their implementation, and difficulties in gaining public acceptance through investment recovery schemes, since special contributions imply that the taxpayer experiences an increase in the value of their property due to the execution of public works or the provision of public services (Olano, 2025) .

Tax Modernization and Strengthening of Local Tax Collection

During the administrative period under study, 70.3% of municipalities reported having updated their local tax regulations, incorporating changes to taxes, fees, and levies as part of strategies aimed at strengthening fiscal management.

The changes were primarily concentrated in property taxes and business licenses (37%) and municipal fees (32%), indicating that local governments rely on traditional sources of financing as a mechanism for fiscal strengthening.

However, progress in tax reform remains uneven. Nearly 30% of municipalities have not implemented changes to their tax structure during their administrative term, reflecting a limited capacity to adapt their revenue collection mechanisms.

On the other hand, the adoption of digital collection mechanisms represents one of the most significant advances identified in the study: 50% of local governments have implemented online collection or arrangements with financial institutions, while 46.1% continue to rely primarily on traditional in-person procedures such as in-person payment at the counter.

Among those municipalities that have implemented digital mechanisms, 75% report improvements in revenue collection levels and process efficiency. These results suggest that digitization is an effective alternative for strengthening local revenue, reducing delinquency rates, and facilitating tax compliance among citizens. However, its consolidation requires greater investments in technological infrastructure, training of personnel, and digital expansion strategies that will significantly reduce the administrative burden, minimize human error, and increase transparency in tax transactions.

Implementation of Digital Mechanisms	*Observed Results*
Municipalities with digitization	75% report improvements in tax collection and efficiency
Key effects	-Strengthening of local revenue. - Reduction in delinquent payments. - Simplification and facilitation of tax compliance

Table 3. Impact of digitization on municipal revenue management, according to finance directors

Effectiveness of Penalty Mechanisms in Revenue Management

Once the significance of municipal taxes to municipal budgets has been identified, it is pertinent to analyze the mechanisms implemented by local governments to strengthen revenue collection. In this context, financial penalties are one of the tools used to encourage taxpayers to comply with their tax obligations.

The results show that 83.9% of municipalities impose fines and charge interest on tax debts and unfulfilled administrative orders, demonstrating the existence of regulatory instruments aimed at strengthening local revenue collection. However, the presence of these mechanisms does not necessarily translate into the effective recovery of financial resources. In practice, financial penalties serve primarily as deterrents, and their ability to increase local revenue is limited due to the institutional challenges local governments face in ensuring compliance.

Table 4. *Imposition of Fines for Noncompliance with Administrative Provisions, Including Nonpayment of Municipal Taxes.*

Percentage of municipalities	*Interpretation*
9.7%	Very low level of fines imposed for tax and administrative noncompliance.

6.5%	Low level of sanctions imposed.
25.7%	Moderate perception regarding the imposition of fines.
58.1%	A favorable perception predominates regarding the imposition of fines for noncompliance with administrative provisions, including tax nonpayment.

The problem is exacerbated by the lack of individualized notification to taxpayers with outstanding balances. This situation reveals a gap between the regulatory authority to impose penalties and the operational capacity to carry out effective debt collection processes.

The absence of systematic enforcement procedures, coupled with the limitations in the management of smaller municipalities, significantly reduces the likelihood of converting fines and interest into effectively collected revenue. As a result, a significant portion of these obligations remains recorded in accounting systems without generating substantial recovery of amounts owed.

Consequently, fines and interest currently constitute a complementary mechanism of tax administration, whose potential to contribute to municipal fiscal autonomy continues to be constrained by structural weaknesses in control, monitoring, and collection processes.

Municipal Cadastral Registry: A Key Factor in Tax Collection.

Additionally, updating the property tax registry emerges as one of the key factors in municipal finances and its proper implementation in tax revenue management. According to financial directors, the municipal property tax registry is a fundamental tool for tax administration, as it allows for the identification and valuation of taxable real estate.

Among the municipalities studied, 55.5% report having an up-to-date land registry that contributes positively to the generation of their own revenue. However, 40.7% disagree with this statement, which highlights the persistence of significant institutional shortcomings.

The lack of georeferenced systems, specialized resources, and technical capabilities limits the ability to fully leverage this tool as a mechanism for strengthening the tax system.

Table 5. *Cadastral updates in small municipalities.*

PERCENTAGE OF MUNICIPALITIES	STATUS OF CADASTRAL UPDATING
55.5%	Municipalities with an updated cadastral registry.
40.7%	Municipalities without an updated cadastral registry.
3.8%	Undefined responses or unspecified categories.

In municipalities with outdated cadastral records, there are unregistered properties, appraisals below actual market value, and deficiencies in identifying tax . These factors reduce municipal governments' tax collection potential and increase their dependence on transfers from the central government.

In quantitative terms, the observed difference implies that nearly four out of every ten municipalities may be missing out on tax revenue opportunities, which affects the generation of funds intended to finance development projects, basic services, infrastructure, and local development programs.

The scientific literature recommends updating property registries more frequently [13] as a key tool in mechanisms to control tax evasion and strengthen local finances.

Challenges in Municipal Own-Source Revenues

The results confirm that the financial sustainability of Ecuadorian municipalities with smaller populations continues to be constrained by a high dependence on transfers from the central government a situation widely documented in the literature on local public finances. Empirical evidence shows that more than 70% of the municipalities studied finance more than half of their budgets through these resources, while more than one-third exhibit dependency levels exceeding 75%. These findings are consistent with the arguments put forward by Piedra and Fierro and by Ramírez and Carrillo, who maintain that the concentration of municipal revenues in intergovernmental transfers reduces the scope for fiscal autonomy and limits the financial planning capacity of local governments. The situation observed in Ecuadorian municipalities appears to replicate a structural pattern found in various Latin American countries, where own-source revenues account for a small share of the municipal budget structure.

Furthermore, the results show that the limited revenue-raising capacity is not due exclusively to economic constraints in the region but also to institutional factors related to tax administration. The low share of taxes, fees, and special levies in municipal budgets confirms the arguments of Rojas and Barberá(2021) , who note that low tax collection is often associated with deficiencies in management mechanisms, a limited tax culture, and weaknesses in the interaction between the administration and taxpayers. In this study, although property taxes and business licenses are perceived as the main sources of own-source revenue, their contribution remains insufficient to significantly reduce dependence on external resources. This reality reveals that the existence of legally established tax sources does not, by itself, guarantee adequate revenue generation if it is not accompanied by administrative capacities that allow for their efficient management.

A particularly relevant finding concerns the role of cadastral updates as a determining factor in tax collection performance. The results show that a significant proportion of municipalities still lag behind in their cadastral systems, a situation that aligns with the arguments of Anchundia and Aguayo(2024) , who identify outdated urban and rural cadastres as one of the main constraints to strengthening municipal finances. The persistence of unregistered properties, outdated appraisals, and difficulties in correctly identifying taxpayers reduces the capacity to collect tax revenue and limits the ability to tap into the existing fiscal potential in each territory. Consequently, the results support the literature that views the cadastre not only as a technical instrument for land-use planning but also as a strategic tool for strengthening local financial sustainability.

The results also provide a basis for discussing the role of administrative modernization and digital transformation in municipal revenue management. Municipalities that have incorporated digital collection mechanisms report favorable perceptions regarding improvements in efficiency and

collection rates, which aligns with Hidalgo's arguments regarding the contribution of administrative simplification and digitization to strengthening tax collection. From this perspective, technological innovation emerges as a viable alternative for overcoming some of the limitations traditionally associated with small municipalities, such as reliance on in-person procedures, high administrative costs, and difficulties in providing efficient services to taxpayers. The findings suggest that digitization can serve as a mechanism for institutional strengthening with positive effects on revenue collection capacity and financial autonomy.

On the other hand, the widespread use of fines and interest for tax noncompliance contrasts with the limitations identified in the processes for effectively recovering outstanding tax debts. Although most municipalities have regulatory instruments to penalize noncompliance with tax obligations, the results indicate that operational difficulties persist in converting these penalties into effectively recovered funds. This finding is consistent with the literature, which warns that the effectiveness of enforcement measures depends on the institutional capacity to carry out notification, monitoring, and collection processes. In this regard, the results suggest that strengthening tax collection requires going beyond the mere existence of penalty mechanisms and moving toward comprehensive tax management systems that combine control, monitoring, technology, and communication with taxpayers.

Finally, the findings support the assertion that municipal financial sustainability must be understood as a multidimensional phenomenon in which fiscal, institutional, technological, and organizational factors interact. In line with the arguments presented by Marcela Paz(2022) and the vision of organizational transformation outlined by Solleiro and Castañón(2024) , the results show that strengthening local revenue requires a comprehensive strategy aimed at modernizing management systems, developing technical capabilities, updating territorial information tools, and diversifying the sources of financing available to local governments. Therefore, the financial autonomy of Ecuadorian municipalities with smaller populations will not depend solely on increasing tax collection efforts, but rather on consolidating institutional processes capable of generating, managing, and sustaining their own resources efficiently and sustainably over time

Conclusions

The results show that Ecuadorian municipalities with smaller populations are heavily dependent on transfers from the central government, a situation that limits their fiscal autonomy and undermines the financial sustainability of their management and territorial development processes. The high share of these resources within the municipal budget structure, coupled with recurring delays in their allocation, creates financial vulnerabilities that affect planning, the execution of investments, and the continuity of strategic projects.

The study confirms that own-source revenues account for a small share of municipal budgets. Although property taxes, business licenses, and fees constitute the main sources of local tax revenue, their contribution remains insufficient to significantly reduce dependence on external resources. Furthermore, special improvement levies remain an underutilized tool due to regulatory, technical, and social constraints that limit their effective implementation.

The findings also demonstrate that institutional capacities play a decisive role in revenue collection performance. Factors such as updating property records, modernizing collection systems, tax audits, and debt recovery directly influence municipalities' ability to strengthen their own-source revenues. In this regard, the adoption of digital revenue collection mechanisms has yielded favorable results and is emerging as a viable alternative for improving local tax efficiency.

Finally, it is concluded that strengthening municipal financial sustainability requires moving beyond dependence on state transfers by promoting comprehensive strategies for tax modernization, cadastral updates, and institutional strengthening. The consolidation of these processes is a necessary condition for increasing the fiscal autonomy of local governments and ensuring greater responsiveness to the development needs of their territories. Future research could complement these findings by incorporating objective financial indicators and longitudinal analyses that allow for the evaluation of the evolution of municipal revenue-raising capacity over time.

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The Ecuadorian Legal System: Coexistence and Resistance of Romanist and Multicultural Legal Models.

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Introduction

The study of Roman law foundations in the context of Ecuadorian legal pluralism is essential for understanding the tensions between the Western legal tradition and the normative systems specific to indigenous peoples and nationalities. The Ecuadorian legal system, influenced by Roman law-based codification, coexists with constitutionally recognized forms of customary law and the jurisprudence of the Anglo-Saxon system, creating challenges in judicial practice, legal interpretation, and the protection of rights. This coexistence reveals not only a normative tension but also an epistemic dispute between different ways of conceiving justice and law (Yrigoyen Fajardo, 2011).

Despite the recognition of legal pluralism in the 2008 Constitution (Constituent Assembly of Ecuador, 2008, Art. 171), the Ecuadorian justice system maintains institutional structures, interpretive methodologies, and legal categories derived from Roman-Germanic law, which creates obstacles to the effective implementation of intercultural justice (Santos, 2010). Analyzing these Roman-law foundations and their implications in the Ecuadorian context is key to moving toward a legal model that is more inclusive, equitable, and respectful of cultural diversity.

In the field of social and legal sciences, the study of complex phenomena such as legal pluralism requires interdisciplinary research approaches that enable an understanding of the historical, cultural, and normative dynamics that shape contemporary legal systems. Scientific research conducted at Latin American universities emphasizes the need to generate contextualized and critical knowledge capable of responding to current social demands and the challenges arising from the cultural and legal diversity present in the region (Barros & Bores, 2024).

Likewise, contemporary trends in academic education highlight the importance of strengthening research skills that promote comprehensive analyses of social and legal realities, thereby fostering the development of proposals aimed at inclusion and the recognition of multiple normative rationalities (Cárdenas-Palomino et al., 2024). In this regard, fostering a culture of research in higher education is essential for the development of critical and intercultural studies that enable an understanding of the interaction between legal tradition, cultural diversity, and social transformation (Carlín-Chávez et al., 2025).

The overall objective of this chapter is to critically examine the influence of Roman law on the contemporary Ecuadorian legal system and its compatibility with constitutionally recognized legal pluralism. To this end, it analyzes the tensions between state law and indigenous legal systems, identifying the main elements of Roman law present in Ecuadorian legislation and

judicial practice. Likewise, it evaluates the limitations and disadvantages that this traditional model may present in the context of a pluralistic and intercultural legal system. Finally, it outlines the main challenges and possible strategies aimed at promoting a more harmonious articulation between the different forms of normative production present in the Ecuadorian context.

This study adopts a qualitative and analytical approach, utilizing theoretical-legal methods, including analysis-synthesis, the legal hermeneutic method, and unstructured interviews with opinion-based sampling, aimed at understanding the theoretical, normative, and practical implications of the presence of Roman law in the Ecuadorian legal system and its relationship to constitutionally recognized legal pluralism. A non-experimental, documentary design is adopted, which allows for a critical examination of legal, doctrinal, and jurisprudential sources without manipulating variables, but rather by interpreting legal contexts and structures in all their complexity (Hernández, et al., 2014).

First, a dogmatic analysis of Ecuadorian law was conducted, focusing on identifying the legal institutions and principles with Roman law roots present in the fundamental bodies of law, particularly the Civil Code, the General Organic Code of Procedure (COGEP), and other legal texts related to private and public law. This analysis was complemented by a systematic review of national and international legal doctrine addressing the reception of Roman law in Latin America and its persistence in contemporary legal systems.

Second, a socio-legal and intercultural approach was incorporated, which allowed for a comparison of state norms with the indigenous legal systems recognized in Article 171 of the Ecuadorian Constitution. Normative and jurisprudential discourses were examined from a critical perspective, paying attention to the power relations between hegemonic (Western) legal knowledge and subaltern (indigenous and community-based) legal knowledge, as proposed by the epistemology of the South (Santos, 2010).

A jurisprudential analysis was also included, focusing on relevant rulings by the Constitutional Court of Ecuador in which tension or dialogue has arisen between state law and indigenous justice. This strategy made it possible to highlight how legal pluralism is interpreted and applied in practice, as well as the difficulties in overcoming Romanist hegemony in the national legal culture.

Finally, an integrative literature review was conducted, drawing on academic sources specializing in Roman law, legal pluralism, multiculturalism, and indigenous law. To this end, academic databases were consulted, prioritizing indexed publications, reference books, institutional reports, and comparative regulatory frameworks.

The triangulation of these sources and methods allowed for the development of a critical and comprehensive view of the legal phenomenon under study, linking the Romanist legal tradition with the contemporary demands for interculturalism and plural justice in Ecuador. Furthermore, this research process is in line with current trends in social science research, which promote interdisciplinary and intercultural approaches aimed at producing contextualized knowledge to address the challenges of contemporary Latin American societies (Barros & Bores, 2024; Cárdenas-Palomino et al., 2024)

Epistemic Tensions Between Roman Law, Common Law, and Indigenous Law in Their Conceptions of Law and Justice

The Roman-law-based legal system, which is dominant in Latin America, is rooted in the tradition of the Roman *Corpus Iuris Civilis*, as reworked during modern codification (Carbonnier, 1994). It is characterized by exhaustive codification, which seeks to anticipate all possible legal situations; by a formalist and logical approach, in which law is conceived as a closed system of hierarchical norms; and by a universalist and state-centered conception of law, in which only the state produces and applies valid norms. From this perspective, justice is defined as the objective application of the law, reducing the judge to a "mouth that pronounces the words of the law" (Montesquieu, 1748/2013).

The Romanist tradition, although historically rooted in the Corpus Iuris Civilis, has evolved into a codified legal system that claims to be exhaustive. Contemporary authors such as Pierre Legrand (2006) criticize the mechanical export of the civil law model to legal systems that do not share its cultural foundations, warning of the limits of normative transposition without epistemological translation. For their part, Martín Böhmer and Roberto Gargarella analyze how Roman-Germanic formalism has perpetuated an authoritarian and hierarchical legal culture in Latin America, one that resists pluralism and intercultural dialogue.

From a critical perspective, Carlos Bernal Pulido has pointed out that Latin American constitutional law still maintains interpretive structures derived from civil law that hinder the recognition of collective or cultural rights in plurinational contexts (Bernal, 2020).

In summary, the contemporary Romanist school is torn between neoconstitutionalism (Alexy, Ferrajoli) which seeks to soften normative rigidity through principles and codified formalism, which still dominates judicial practice in many countries.

For its part, common law developed primarily in England and adopted in countries such as the United States, Canada, and Australia is built upon binding judicial precedents, where the rulings of higher courts constitute a direct source of law (Dworkin, 1986); with a less codified and more case-specific structure, adapted to social and economic evolution, and a more pragmatic and flexible approach, where legal reasoning and the justice of the specific case carry greater weight than the formal application of rules. Justice in the common law is understood as the result of a balanced adversarial process, in which precedent guides the reasonable resolution of the case, without claims to universality.

Although the common law is also foreign to the Ecuadorian tradition, it exerts an indirect influence through the dissemination of doctrines such as the balancing of principles, reasonableness tests, and the " " legal argumentation, which have been adopted by constitutional courts in Latin America. Authors such as Neil MacCormick (2005) and Joseph Raz have developed a theory of law based on practical rationality, in which judicial precedent and progressive interpretation play a central role in the pursuit of justice.

More recently, Cass Sunstein has proposed the concept of deliberate incompleteness in law, advocating for prudent, case-by-case judicial decisions as a method for addressing pluralistic contexts (Sunstein, 2019). His vision has been embraced in debates on intercultural constitutionalism, where flexibility and balance take on particular relevance.

In Latin America, Rodrigo Uprimny has been an advocate for the strategic use of common law standards in constitutional courts to protect rights in structural contexts of inequality, without entirely abandoning the codified framework. In contrast to these state systems, indigenous legal

systems are based on cosmocentric and relational conceptions of law. Law is not a set of abstract norms but rather a set of social and spiritual practices, integrated with nature, history, and the people's worldview (Yrigoyen Fajardo, 2011).

In this regard, features such as orality, consensus, and rituality stand out in conflict resolution processes; thus, justice is oriented toward redressing harm and restoring community balance, not toward imposing an individual punitive sanction. It is based on principles of reciprocity, complementarity, and balance which are very different from the punishment or economic restitution characteristic of modern law (Santos, 2010).

Indigenous legal systems, historically ignored or subordinated, have gained constitutional recognition in countries such as Ecuador, Bolivia, and Colombia. However, their integration into the state legal system has been contentious and incomplete. Authors such as Raquel Yrigoyen Fajardo, Luis Macas, and Carlos Mamani argue that indigenous law must be understood from its own epistemological perspective not as a "subsystem" of state law, but as a complete system, valid in and of itself, with distinct principles such as harmony, communal reparation, and a spiritual relationship with nature.

From a global critical perspective, Boaventura de Sousa Santos (2010) has been a central figure in proposing the idea of an epistemology of the South, which recognizes ancestral legal knowledge as legitimate and proposes an "ecology of knowledge" to overcome the legal monoculturalism of the modern state.

In the Ecuadorian context, Nina Pacari and Mario Melo have documented the tensions between ordinary justice and indigenous justice, noting that Romanist hegemony limits the actual applicability of legal pluralism. The restrictive interpretation of Article 171 of the Constitution has been one of the main obstacles, according to these voices. In plurinational contexts such as Ecuador, Bolivia, or Canada, the coexistence of Roman law, common law, and indigenous legal systems generates profound epistemic tensions that transcend the normative and affect the very understanding of law, its legitimacy, and its purpose (Cantillo Pushaina, 2021).

Each legal system is grounded in different rationales. Roman law prioritizes codification, formal legal certainty, and a logical, hierarchical approach to law. Common law, on the other hand, is based on case law and precedent, with a pragmatic and flexible approach oriented toward justice in each individual case. In contrast, indigenous law is rooted in custom, oral tradition, and a communal worldview, with a restorative purpose centered on social harmony. These differences are also reflected in the role of the judge, the source of legal validity, and the institutional forms of conflict resolution. While the Roman law system prioritizes the application of written rules, the common law relies on judicial interpretation, and indigenous systems draw on dialogue and consensus as legitimate forms of justice.

As Santos (2010) points out, these tensions cannot be resolved through technical coordination rules but require a profound intercultural dialogue, mutual epistemic recognition, and a structural transformation of the state legal system. For legal pluralism to be authentic, the equal dignity of indigenous legal systems must be guaranteed by rethinking legal education, judicial practice, and dominant interpretive frameworks.

Table 1. *Comparative Overview and Summary of Epistemic Tensions*

DIMENSION	ROMAN LAW	COMMON LAW	INDIGENOUS LAW	REPRESENTATIVE AUTHORS
LEGAL EPISTEMOLOGY	Logic, Systematicity, Legalism	Practical Reasonableness, Precedent	Relationality, orality, spirituality	Legrand, Böhmer, Alexy
SOURCE OF VALIDITY	Written law, state codification	Judicial decisions, precedents	Living custom, community authority	MacCormick, Sunstein, Uprimny
CONCEPTION OF JUSTICE	Objective application of rules	Case-specific justice, contextual equity	Social harmony and redress for harm	Yrigoyen Fajardo, Santos, Macas
INSTITUTIONAL PRACTICE	Formalism, hierarchy, litigation	Balanced contradiction, flexibility	Dialogue, consensus, collective mediation	Mamani, Melo, Pacari

Source: Author's own work, 2026

These tensions are not only legal but also deeply ontological and epistemological. For pluralism to be effective, it is necessary to recognize the equal dignity of indigenous legal systems, which implies transforming not only laws but also legal education, interpretive methods, and the power structures of the judicial system.

From Monistic Neo-Romanism to the Mixed System in Ecuador:

Identification of the Main Features.

The Ecuadorian legal system was historically structured within the Romanist or Romano-Germanic tradition, adopted in the 19th century under the influence of European codes, particularly the French Civil Code of 1804 and, to a lesser extent, the Chilean Civil Code by Andrés Bello. However, this process has deeper roots in the colonial era, when the Spanish Empire imposed the legal model of Castilian law on the Americas, based on compilations of laws such as the Seven Partidas and the New Compilation of the Laws of the Indies, which reflected a centralist, Christian, and hierarchical logic. This influence consolidated a state-centered legal culture that survived independence and continued to develop in the subsequent republican legal system (Wolkmer, 2012).

This legacy was reflected in the systematic codification of laws, the predominance of written law as the central source of law, and a formalist, logical, and hierarchical legal approach (Carbonnier, 1994; Wolkmer, 2012). In this model, the state was conceived as the sole legitimate producer of law, which consolidated a monist and statist view of the legal order.

For more than a century, this structure excluded other forms of normative production, particularly the legal customs of indigenous peoples, which were ignored, repressed, or, at best, informally tolerated. State justice was imposed as the sole legitimate form of conflict resolution, without recognizing the epistemological and normative diversity existing in the country.

This paradigm began to shift with the enactment of the Constitution of the Republic of Ecuador in 2008, which marked a historic turning point by declaring the country a constitutional state of

rights and justice, plurinational and intercultural (Art. 1). In line with this new model, Article 171 explicitly recognizes the jurisdiction of indigenous peoples and nationalities to administer justice in accordance with their own norms and procedures, within their territorial spheres, provided that they do not violate constitutional rights.

This constitutional recognition represents a partial shift away from traditional legal monism toward a model of legal pluralism, both at the normative and epistemological levels. Law is no longer conceived as a single, homogeneous, state-centered system, but rather as a set of coexisting legal systems, each with its own rationale, authority, and legitimacy. It is, therefore, a form of pluralism that goes beyond the formal coexistence of norms and paves the way for the recognition of diverse legal knowledge, as proposed by authors such as Boaventura de Sousa Santos (2010) and Antonio Carlos Wolkmer (2012).

However, this constitutional shift is still mediated by the state framework, which imposes limits on the exercise of indigenous jurisdiction, establishing a relationship of coordination that in practice often translates into subordination. Ecuadorian legal pluralism, therefore, is in a phase of tension and development, in which a genuine intercultural dialogue among legal rationalities must be consolidated.

In this context, the coexistence of ordinary and indigenous jurisdictions has repeatedly generated practical and conceptual tensions. On the one hand, the Constitutional Court has recognized that legal pluralism implies a dialogue between jurisdictions rather than hierarchical subordination (Ruling No. 001-10-SAN-CC, 2010). A prime example of this position is Judgment No. 113-18-SEP-CC (the "La Cocha" case), in which the Court analyzed an indigenous justice proceeding conducted by the Kichwa community of La Cocha in Tungurahua, and while it recognized the legitimacy of the exercise of indigenous jurisdiction within its territorial and cultural sphere, it established that such exercise must be subject to unrestricted respect for constitutional rights and fundamental guarantees, such as due process and non-discrimination.

The ruling reaffirmed that state oversight of indigenous jurisdiction must not be hierarchical or arbitrary, but must ensure coordination based on mutual respect and intercultural dialogue between legal systems. Thus, the Court defined clear limits on the exercise of indigenous justice, especially when potential human rights violations exist, striking a balance between legal pluralism and constitutional protection.

However, obstacles persist in practice, such as the lack of clear guidelines on jurisdictional limits; if a legal dispute involves individuals who do not belong to the indigenous community or to other communities with different legal systems, the indigenous " " jurisdiction may not have the authority to hear the case; there are no criteria for intercultural interpretation or effective mechanisms for coordination between the systems.

Furthermore, there are cases in which the ordinary justice system has disregarded decisions of the indigenous jurisdiction, citing an alleged violation of rights, without properly applying the principle of interculturality or respecting community due process (Yrigoyen Fajardo, 2011).

At the legal level, the recognition of legal pluralism is primarily enshrined in the 2008 Constitution. However, its implementation in ordinary laws has been limited. The Organic Law on Jurisdictional Guarantees and Constitutional Review (LOGJCC) provides for certain mechanisms to resolve conflicts of jurisdiction and guarantee rights within their respective procedures. In particular, Article 344 of this law regulates conflicts of jurisdiction between the ordinary courts and the indigenous courts, providing that the Constitutional Court shall resolve such conflicts when constitutional rights are affected or doubts arise regarding the scope of jurisdiction.

With regard to case law understood as the interpretation of the courts it does not have the same binding or precedential character as in common law systems, where judicial doctrine is a primary source of law. This legacy influences how case law is perceived and applied in Ecuador: strict application of the code and laws takes priority, and case law serves as an interpretive guide but does not always directly bind other judicial bodies.

However, in Ecuador, the creation of the Constitutional Court and its role in the supreme interpretation of the Constitution have led to its rulings having binding force and serving as a key source for resolving legal and constitutional conflicts. This development is part of what is known as judicial constitutionalism, where case law becomes a mechanism for the effective protection of rights and the control of state power.

Thus, since the advent of modern constitutions and constitutional courts in Latin America especially since the late 20th century constitutional jurisprudence has taken on an increasingly important role and, in many countries, has become binding on judicial and administrative bodies. This phenomenon is linked to the expansion of both diffuse and concentrated constitutional review, the institutionalization of constitutional courts, and the influence of European and U.S. models.

However, despite these advances, the application of case law in Ecuador faces several challenges. First, there is cultural and traditional resistance, given the deep-rooted nature of the codified civil law system, which prioritizes the legal text and views case law merely as a guiding interpretation, not as a binding source; this leads to disparity in judicial application and reduces the uniformity of the law. Second, the lack of systematization and access makes it difficult for case law to be accessible or sufficiently disseminated among judicial practitioners, limiting its consistent application. Furthermore, institutional fragmentation resulting from the coexistence of multiple judicial bodies with differing criteria and levels of recognition of case law hinders its uniform application.

Another significant problem involves the challenges in implementing binding precedent: although the Constitutional Court issues binding rulings, the mandatory application of these precedents in lower courts is not always fully enforced, which creates legal uncertainty and a lack of respect for judicial authority. Finally, political influence and external pressures in some cases affect judicial independence and the consistency and credibility of case law.

In summary, case law in Ecuador is undergoing a process of strengthening as a source of law, especially in the constitutional sphere, but its full effectiveness is limited by the persistence of a formalist civil law tradition, institutional and cultural difficulties, and practical problems in its dissemination and uniform application. The adoption of Latin American judicial constitutionalism has fostered a more active role for case law, making it a key instrument for the protection of rights and the checks on power; however, challenges remain in consolidating its function as a binding and rights-protecting mechanism within the Ecuadorian legal system.

In conclusion, the Ecuadorian mixed legal system shares characteristics with three legal systems: the Roman-Germanic, the common law, and the ancestral systems. Its main characteristics can be detailed as follows:

Elements of Roman Law in the Ecuadorian System

- Extensive legal codification: Use of codes such as the Civil Code, the Comprehensive Organic Criminal Code (COIP), and the General Organic Code of Procedure (COGEP), inherited from the Roman-Germanic tradition. (Pérez Perdomo, 2001).

- Primacy of written law as the primary source of law (Zambrano, 2015).
- Use of legal syllogism and deductive logic in judicial interpretation (Ferrajoli, 2007).
- Formal separation between public and private law, a structural characteristic of civil law (David & Brierley, 2009)
- Judicial decisions do not create law: they are interpretive in nature and non-binding, with certain exceptions (constitutional precedent). (Art. 425 CRE; Civil Code)

Elements of Anglo-Saxon law (common law) incorporated

- Flexible evaluation of evidence and the adoption of oral proceedings in judicial processes. (COGEP, Arts. 5–7).
- Growing importance of binding case law, particularly in constitutional matters (binding precedent). (Constitutional Court, Ruling No. 001-10-SAN-CC).
- Influence of adapted stare decisis, especially to ensure legal certainty. (Ávila Santamaría, 2008).
- Balancing of principles and rights in judicial reasoning, inspired by Anglo-Saxon neo-constitutionalist models. (Alexy, 2003).
- Application of principles such as due process, the right to be heard, equality of arms, and the standard of reasonable proof, which are common in common law. (Art. 76 CRE; Art. 3 COGEP)

Elements of Indigenous Law

- Constitutional recognition of indigenous jurisdiction (Art. 171 CRE) as part of legal pluralism (Constitution of Ecuador, 2008).
- Use of customary norms and indigenous conflict resolution systems within indigenous communities. (COFJ, Arts. 344–347).
- Emphasis on restorative and community-based justice, seeking to restore harmony rather than to punish. (Yrigoyen Fajardo, 2011).
- The principle of sumak kawsay (good living) as an ethical and legal criterion rooted in the indigenous worldview. (Gudynas, 2011).
- Progressive integration into the institutional practices of the ordinary legal system through interjurisdictional coordination processes. (Santos, 2010)

Disadvantages of the Romanist model in a multicultural context.

The Romanist or continental model upholds a unitary and homogeneous view of law, in which the judge plays a role subordinate to the legislature, and in which case law, with recent exceptions, has no binding force.

This conception is problematic in contexts such as Ecuador's, where legal pluralism is expressly recognized in the Constitution (Art. 171), and where different legal systems coexist, such as the state system, the indigenous system, and the customary forms of conflict resolution used by peasant, Afro-descendant, and migrant communities. In light of this reality, the Romanist model imposes a rigid structure that does not promote the integration or equal recognition of other sources of law.

One of the most critical drawbacks of this model is the hierarchical structure of the legal system, which excludes or subordinates non-state legal forms. For example, although custom may be recognized as a subsidiary source (Art. 2 of the Civil Code), its application is conditional on it not contradicting written law, which limits its actual effectiveness in contexts where such custom is the primary norm governing social coexistence. Case law, for its part, although it has gained ground in recent decades through the binding jurisprudential doctrine of the Constitutional Court, continues to face resistance from legal practitioners trained in classical legalism, for whom a court ruling does not create law but merely interprets it.

The differentiated use of sources law, case law, and custom raises serious practical tensions. In indigenous justice, for example, the applicable norm is neither codified nor systematized but is transmitted orally, with deep roots in the territory and culture. However, the Romanist model requires documentary or codified evidence to validate any norm in court, which hinders intercultural dialogue between legal systems. Thus, state judges face difficulties in validly incorporating customary legal norms into their decisions, due to a lack of adequate procedural mechanisms or training in intercultural methodologies.

Furthermore, constitutional case law which has sought to establish standards for coordination between legal systems (as in rulings No. 113-14-SEP-CC or No. 2183-12-EP/21) does not always translate into consistent or uniform judicial practice. This is due, among other reasons, to the lack of general binding force of judicial precedents, institutional weakness in their enforcement, and persistent mistrust of indigenous law, which is often stigmatized as precarious or informal.

Therefore, in the face of a pluralistic legal model, Ecuador's Romanist legal system presents not only technical limitations but also philosophical and structural ones. Overcoming these requires a profound rethinking of the place occupied by the various sources of law within the legal system, recognizing that not all valid forms of legality conform to a written, codified, and systematized format. It also involves equipping judges, prosecutors, public defenders, and attorneys with the tools to apply criteria for intercultural interpretation, to assess " " or customary law autonomously, and to understand case law as an active source of articulation between legal systems.

In short, the Romanist model, in its traditional form, is not a barrier per se; ideology, the actual worldview, and structures all play a role, but the model is insufficient to address the legal complexity of contemporary Ecuador, where an approach is needed that recognizes the epistemic and normative legitimacy of diverse legal cultures and is guided by a logic of horizontal dialogue among sources of law.

Pathways toward a more harmonious intercultural integration of the legal system.

The constitutional recognition of legal pluralism in Ecuador (Art. 171 of the Constitution) represents a milestone in the development of an intercultural justice system, but it also poses complex theoretical and practical challenges. The harmonious integration of diverse legal systems such as the state, indigenous, and community systems cannot be achieved through formal recognition alone; rather, it requires a structural transformation of the way in which sources of law are conceived and applied. Within this framework, one of the greatest challenges is to overcome the hierarchical and exclusionary vision of the legalistic model inherited from Roman law, which prioritizes codified written law and downplays other forms of legal norms such as custom or case law.

In practice, this tension is evident in the day-to-day handling of conflicts involving individual and collective rights, where state law may conflict with the customary principles of indigenous communities. Intercultural coordination involves not only recognizing the validity of these communities' own norms but also establishing institutional and jurisprudential mechanisms that enable horizontal dialogue and effective coordination among jurisdictions, while respecting fundamental rights.

One of the main challenges lies in the treatment of sources of law: while the state system relies primarily on codified laws and general principles of positive law, community legal systems are based on oral norms, repeated social practices, and criteria of ancestral authority that do not always conform to the formal standards required by ordinary law. This requires justice practitioners judges, prosecutors, public defenders, and attorneys to have in-depth training in interculturality, as well as methodological tools that enable them to interpret and apply the law from a pluralistic perspective.

Likewise, constitutional jurisprudence has sought to establish criteria to guide this intercultural coordination. Rulings such as No. 113-14-SEP-CC and No. 2183-12-EP/21 have established principles of coordination, limits on state control over indigenous decisions, and criteria for the validity of community justice, such as respect for fundamental rights and the principle of proportionality. However, the implementation of these precedents faces obstacles such as a lack of training, cultural resistance from some judicial officials, and the absence of clear protocols for resolving conflicts of jurisdiction or regulatory contradictions.

The Anglo-Saxon model particularly its robust jurisprudential development offers useful lessons in this context. The doctrine of binding precedent (stare decisis) allows for a dynamic evolution of the law based on judicial decisions, which can be replicated in part in Ecuador through the doctrine of mandatory constitutional interpretation. This would enable judges to develop jurisprudential criteria that reconcile constitutional rights with community legal systems, promoting coherence, legal certainty, and respect for diversity.

Among the possible avenues for moving toward a more harmonious intercultural articulation of the Ecuadorian legal system, the following can be identified:

- Design coordination protocols between jurisdictions, including clear criteria for determining jurisdiction, mechanisms for prior consultation, and rules for applying diverse sources of law.
- Strengthen intercultural legal education by incorporating content on legal pluralism, legal anthropology, intercultural analysis methodology, and the treatment of custom as an autonomous source into law school curricula.
- Recognize and systematize community-based legal practices, respecting their autonomy while facilitating their understanding by the state system through voluntary regulatory registries or compendia prepared by the communities themselves.
- Expand the use of case law as a tool for intercultural coordination, promoting the development of precedents that recognize the standards of validity and legitimacy of indigenous law, with binding force throughout the rest of the system.
- Foster spaces for ongoing intercultural dialogue between state system officials and community justice authorities through technical working groups, cooperation networks, regional meetings, and support from human rights institutions.

Ultimately, intercultural coordination cannot be limited to a passive coexistence of norms. It requires an active, critical, and proactive process of jointly constructing the law, in which diversity

is recognized as a source of legal legitimacy and traditional notions of validity, authority, and justice are redefined. Only in this way can a truly pluralistic, inclusive legal system be consolidated one that respects the cultural identity of the peoples inhabiting Ecuador.

Conclusions

The analysis conducted confirms that in Ecuador, deep tensions persist between state law based on the Roman law model and indigenous legal systems and Anglo-Saxon-influenced case law, resulting from structural differences regarding the sources of law, the purposes of justice, and methods of conflict resolution.

It was found that Ecuadorian legislation retains strong elements of the Roman law tradition, such as the primacy of written law, the codified structure of the legal system, and a rigid hierarchy of legal sources. This model, however, has limitations in contexts of cultural diversity, as it does not adapt flexibly to customary and community-based forms of law.

In light of this, the pluralistic legal model emerges as a more appropriate path toward the effective recognition of diversity, although it poses complex challenges. Among these are the need to harmonize constitutional principles with indigenous legal practices, to strengthen the intercultural training of justice practitioners, and to develop case law that respects both fundamental rights and community values.

Finally, the paper proposes moving toward a more harmonious intercultural integration through institutional reforms, mechanisms for coordination among jurisdictions, and the development of a legal theory that legitimizes legal pluralism not only as coexistence but as a transformative dialogue among diverse legal systems.

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The Influence of Roman Law on the Development of Serbian Law: Historical and Contemporary Aspects

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Introduction

The influence of Roman law on the development of European legal systems is one of the most significant phenomena in the history of Western law. Its ability to adapt to different political, social, and cultural contexts has allowed for the survival of legal institutions and categories developed in antiquity, which were subsequently refined through Byzantine law, medieval ius commune, and the great modern codifications. From this perspective, the Serbian legal experience represents a particularly interesting case, as it developed in a geographical space historically situated between Eastern and Western Europe, serving as a privileged meeting point between different legal traditions and heterogeneous cultural models (Stein, 1999; Biondi, 1952).

Serbia, due to its geopolitical position situated between the Latin, Byzantine, and Ottoman worlds, has experienced a plurality of legal influences throughout its historical evolution that have contributed to the formation of its legal identity. Roman law, in particular, has played a role of extraordinary importance across different historical phases and through modes of reception that were not always uniform. Unlike other European legal systems characterized by a more linear continuity of the Romanistic tradition, the Serbian experience is distinguished by the existence of at least two major cycles of reception: the first mediated by Byzantine law in the Middle Ages and the second carried out in the 19th century through the process of civil codification inspired by the Austrian model and the tradition of the ius commune (Zimmermann, 1996; Kaser et al., 2016).

The medieval reception of Roman law developed within the Serbo-Byzantine civilization during the reign of the Nemanjić dynasty, when Eastern Roman law entered the Serbian legal system primarily through translations and adaptations of Byzantine legal compilations. Through works such as Saint Sava's Nomocanon, the Syntagma of Matthew Blastares, and the Code of Dušan, categories and principles derived from the Justinian tradition became part of Serbian legal culture, contributing to the formation of an original legal system in which elements of Roman origin coexisted with local customary institutions and ecclesiastical norms (Obolensky, 1971).

A second and equally significant phase of reception occurred in the 19th century, in the context of Serbia's political emancipation from the Ottoman Empire and the construction of the modern state. The adoption of the Serbian Civil Code of 1844 marked a decisive moment in the nation's legal history, as it enabled the systematic introduction of numerous Roman law principles through the Austrian Allgemeines Bürgerliches Gesetzbuch of 1811. However, this phenomenon did not result in mere legislative imitation but gave rise to a process of legal adaptation in which different legal traditions converged, including Serbian customary law, canon law, French law, and, to a limited extent, certain institutions derived from the Islamic tradition (Stein, 1999).

Even during the Yugoslav socialist period, despite the formal repeal of the Serbian Civil Code of 1844 and the establishment of new economic and social principles, the Roman law tradition continued to exert a significant influence on the regulation of obligations, property rights, and property relations. The persistence of legal categories developed in Roman law attests to the extraordinary resilience of this legal tradition, which has survived the ideological and institutional changes that have characterized contemporary European history (Zimmermann, 1996).

The current debate regarding the drafting of a new Civil Code for the Republic of Serbia further confirms the enduring centrality of the Romanistic tradition in the national legal culture. The codification project launched in the 21st century highlights, in fact, the desire to reconcile the needs for modernization, harmonization with European Union law, and historical continuity with a legal tradition dating back thousands of years that continues to constitute one of the main foundations of European legal identity.

From this perspective, the study of the Romanistic tradition is not merely an exercise in historical reconstruction but also serves as a tool for scholarly research capable of fostering interdisciplinary and comparative approaches within the social sciences. The growing focus on integrated research models, aimed at understanding the historical and institutional dynamics that influence contemporary systems, underscores the importance of dialogue between history, law, higher education, and processes of academic innovation. In this sense, the promotion of the Roman legal heritage is part of current trends toward the internationalization of university research, the development of scientific culture, and the promotion of the university's transformative role in the construction of knowledge, the transfer of knowledge, and the formation of new interpretive perspectives on contemporary legal realities (Barros & Bores, 2024; Cárdenas-Palomino et al., 2024; Carlín-Chávez et al., 2025).

The study of the influence of Roman law on the development of Serbian law is therefore significant in two ways. On the one hand, it allows us to reconstruct the historical paths through which the Roman legal tradition spread throughout the Balkans; on the other hand, it enables us to understand how legal concepts developed in antiquity continue to influence codification processes, legislative techniques, and the evolution of contemporary legal systems to this day. The Serbian case thus serves as an emblematic example of Roman law's ability to adapt to different historical contexts while maintaining its role as the common cultural foundation of the European legal experience.

Serbia: A Crossroads of Many Paths

Throughout European history, Serbia's geographical location has been one of the main factors shaping its political, cultural, and legal identity. Situated in the heart of the Balkan Peninsula and positioned along major commercial and military routes connecting the eastern Mediterranean to Central Europe, Serbia has for centuries served as a space of contact, interaction, and, at times, conflict between different civilizations. This unique geopolitical location has fostered the overlapping of multiple legal traditions, contributing to the development of a legal system characterized by marked historical complexity and a significant diversity of cultural influences (Obolensky, 1971; Fine, 1991).

The Republic of Serbia today occupies a strategic position in southeastern Europe. Its capital, Belgrade, stands at the confluence of the Danube and Sava rivers, an area that has been a key hub for communications between East and West since antiquity. The ancient Roman city of Singidunum, founded on the site of earlier Celtic settlements, was incorporated into the Roman Empire in the 1st century A.D. and subsequently included in the province of Upper Pannonia. Its strategic importance was such that it permanently hosted the Legio IV Flavia Felix, tasked with defending the Danubian limes and controlling the communication routes that crossed the Balkans (Mócsy, 1974).

The incorporation of Serbian territory into the Roman sphere of influence was not merely a military or administrative phenomenon; it also entailed the spread of organizational models, public institutions, and legal concepts that would exert a lasting influence on the region's

subsequent legal developments. The Roman presence, in fact, contributed to the gradual integration of local populations into the imperial system, fostering the spread of Roman citizenship, administrative practices, and legal concepts developed within the classical tradition (Stein, 1999).

With the division of the Roman Empire in 395 CE, the territory of present-day Serbia permanently entered the sphere of influence of the Eastern Roman Empire, later known as the Byzantine Empire. This circumstance would prove decisive for the development of medieval Serbian law, as it allowed for the indirect transmission of the Roman legal tradition through Byzantine law, which served as one of the main vehicles for the preservation and reinterpretation of the Justinian legal heritage (Ostrogorsky, 1969).

Beginning in the 5th century, the Balkan region was affected by large-scale migrations of peoples, a phenomenon that contributed to a profound change in the region's political structure. The incursions of the Huns, Ostrogoths, and other Germanic peoples were followed, in the 6th and 7th centuries, by the permanent settlement of the Slavs and Avars, a development that led to a gradual transformation of the territory's ethnic and cultural composition. Although Byzantium formally retained sovereignty over large portions of the Balkans, its political control gradually weakened, facilitating the emergence of new Slavic state entities (Fine, 1991).

The emergence of the medieval Serbian state under the Nemanjić dynasty, between the 12th and 14th centuries, marked a period of unprecedented political, economic, and cultural consolidation. During this period, Serbia achieved a high level of institutional development, characterized by the establishment of a complex legal system that incorporated elements of local customary law, the Orthodox canonical tradition, and Roman-Byzantine law. Serbia's unique position as a frontier region between the Latin-Catholic world, the Byzantine realm, and, later, the Ottoman Empire fostered the formation of an original and deeply stratified legal culture (Ćirković, 2004).

The Ottoman conquest of the Serbian Despotate in 1459 brought about a significant interruption in the processes of legal development that had begun during the Middle Ages, imposing new administrative and institutional models. However, the legacy of the Serbian-Byzantine tradition did not disappear entirely, continuing to survive in cultural memory, ecclesiastical practices, and certain customary institutions that would reemerge during the period of national revival in the 19th century (Sugar, 1977).

The nineteenth century represented a crucial phase in the reconstruction of Serbian national identity. The uprisings of 1804 and 1815 set in motion a long process of political emancipation from the Ottoman Empire, culminating in the international recognition of Serbian independence at the Congress of Berlin in 1878. Parallel to the establishment of new state institutions, an intense process of legislative modernization unfolded, aimed at bringing the Serbian legal system closer to continental European models, a phenomenon that would foster a new and profound reception of the Romanistic tradition through the Civil Code of 1844 (Stein, 1999).

Serbia's history thus appears to be characterized by constant interaction among different legal civilizations, whose mutual influences have contributed to the formation of a complex and dynamic legal system. This plurality of normative contributions constitutes one of the distinctive elements of the Serbian legal experience and represents an indispensable prerequisite for understanding the subsequent processes of reception of Roman law, both in its Byzantine dimension and in its modern reworking through the tradition of the European ius commune.

The First Phase of the Reception of Greco-Roman Law

The first reception of Roman law into the Serbian legal sphere took place during the Middle Ages and developed within the framework of the deep political, religious, and cultural ties established between medieval Serbia and the Byzantine Empire. Unlike what would occur in the 19th century when the Roman legal tradition would be transmitted through the codifications of Western continental Europe the medieval reception took place through the filter of Byzantine law, that is, through the complex legal elaboration that legal scholarship identifies as ius graeco-romanum (Troianos, 2015).

The Byzantine experience, in fact, played an essential role in the preservation and transmission of the Justinian legacy after the dissolution of the Western Roman Empire. While in Western Europe Roman law underwent a long phase of fragmentation and transformation, in the Eastern Empire the Justinian compilations continued to serve as the primary normative reference point, even as they were progressively adapted to the needs of a society that had changed profoundly since classical times. In this process, numerous legislative collections, translations, and summaries were produced to make the Roman legal heritage more accessible, including the Ecloga, the Procheiron, the Epanagoge, and the Basilicae works that would exert a significant influence on the legal systems of Orthodox Slavic societies.

In the case of Serbia, the reception of Greco-Roman law took place primarily through two complementary means. On the one hand, Byzantine legal compilations were translated into the Slavic language, enabling the dissemination of Roman legal institutions and categories within a different cultural context. On the other hand, provisions derived from Byzantine legislation were directly incorporated into the statutory texts drafted by Serbian authorities, giving rise to a process of selective adaptation of Roman sources to the social and political needs of medieval Serbia (Ćirković, 2004).

The first major milestone in this reception coincided with the drafting of Saint Sava's Nomocanon (Zakonopravilo), compiled in 1219 in conjunction with the Serbian Church's attainment of autocephaly. The work represents one of the most important legal documents in the Serbian medieval tradition, as it integrates canonical norms, ecclesiastical provisions, and significant components of Byzantine civil legislation. Included in it were portions of Justinian's Novellae, the Procheiron, and certain constitutions of Emperor Alexios I Komnenos, concerning matters such as marriage, betrothal, and the regulation of slaves (Troianos, 2015).

The importance of the Nomocanon transcends the purely ecclesiastical sphere. The courts of the medieval Serbian Church, in fact, exercised very broad jurisdiction, extending not only to the clergy but also to numerous areas of civil life. Through their judicial activity, principles and categories derived from Roman-Byzantine law were gradually assimilated into local legal practice ( ), contributing to the formation of a legal culture in which Roman, canonical, and customary elements coexisted in a relatively harmonious manner (Obolensky, 1971).

In the 14th century, the process of reception accelerated further during the reign of Emperor Dušan, a period that coincided with the peak of the medieval Serbian state's political and territorial development. The sovereign's imperial ambition and his desire to bring greater systematic order to the legal system fostered the compilation of important collections of laws inspired by the Byzantine model. It is within this context that the so-called Law of Emperor Justinian, the Abridged Syntagma by Matthew Blastares, and the famous Code of Dušan (Fine, 1994) were produced.

The Law of Emperor Justinian constitutes an interesting testament to the creative capacity of medieval Serbian jurists. Although numerous provisions were derived from the Nomos Georgikos, the Procheiron, and the Basilika, the compilation appears to have no known Greek counterpart and is generally considered an original product of Serbian legal culture. This demonstrates that the reception of Roman law was not limited to a mere transposition of legal norms but involved processes of reinterpretation and adaptation tailored to the economic and social needs of medieval Serbia (Troianos, 2015).

The translation and adaptation of Matthew Blastares' *Sintagma* was also particularly significant. Compiled in 1335 by the monk from Thessaloniki, this work represented a vast collection of civil and ecclesiastical laws intended to systematize the Byzantine legislation in force. The Serbian version, produced between 1347 and 1348, was, however, substantially shortened, from over three hundred chapters to fewer than one hundred. The decision to eliminate most of the ecclesiastical provisions highlights the intention to direct the text primarily toward civil courts, assigning it a practical role in the administration of secular justice (Ćirković, 2004).

The culmination of the medieval process of reception of Roman law came with the enactment of the Code of Dušan in 1349, which was subsequently expanded in 1354. Although considered an independent creation of the Serbian legal tradition, it incorporates a considerable number of provisions derived from Byzantine compilations, confirming the close cultural ties between medieval Serbia and the Eastern Roman Empire. The presence of provisions that subordinate even the emperor's will to respect for the law reveals the assimilation of principles of Roman-Byzantine origin regarding the superiority of the legal system over the arbitrariness of political power (Burgmann, 1991).

Articles 171 and 172 of the Code constitute, in this sense, an emblematic example. They stipulate that judges are not required to apply imperial decrees that contradict the law and that they must decide disputes in accordance with the codified provisions, without allowing themselves to be influenced by the sovereign's authority. These principles attest to the maturation of a legal conception in which the law assumes a superior organizing function with respect to the mere personal will of the ruler, anticipating trends that would characterize the development of the European legal tradition in the centuries that followed (Stein, 1999).

The initial reception of Roman law in Serbia thus appears as a complex and layered phenomenon, in which the Justinian tradition was reinterpreted through Byzantine law and subsequently adapted to the political, religious, and social needs of the medieval Serbian state. Far from constituting a mere imitation of Eastern imperial legislation, it contributed to the formation of an original body of law, capable of integrating elements drawn from different legal traditions and of consolidating the cultural foundations upon which the modern Serbian legal identity would develop in the centuries that followed.

Second Phase of the Reception of Roman Law The Serbian Civil Code of 1844

The second phase of the reception of Roman law in Serbian territory took place in the 19th century, against the backdrop of profound political, institutional, and cultural transformations that accompanied Serbia's gradual emancipation from Ottoman rule and the construction of a modern nation-state. Unlike the medieval reception, which developed through the mediation of Byzantine law and the Eastern Greco-Roman legal tradition (ius graeco-romanum), the nineteenth-century reception was part of the broader European phenomenon of civil

codification, drawing inspiration from the principles developed by the tradition of the ius commune and the legislative experiences of continental Europe (Stein, 1999; Zimmermann, 1996).

The adoption of the Serbian Civil Code of 1844 (Srpski građanski zakonik) represented one of the most significant events in modern Serbian legal history. It was, in fact, the fourth European civil code to be enacted after the French Civil Code of 1804, the Austrian Allgemeines Bürgerliches Gesetzbuch of 1811, and the Dutch Civil Code of 1838, placing Serbia among the first European states engaged in the construction of a unified and systematically organized private law system. This fact takes on particular significance when one considers that, until just a few decades earlier, Serbian territory was still part of the Ottoman political-administrative structure and characterized by the prevalence of customary law and a fragmentation of legal sources.

The decision to proceed with civil codification reflected the need to provide the new state with a regulatory framework capable of ensuring legal certainty, legislative uniformity, and the consolidation of institutions. In this context, Roman law was viewed not only as the historical heritage of European legal culture but also as a theoretical foundation capable of supporting the modernization of the state and Serbia's integration into the continental model of civil law (Wieacker, 1995).

The drafting of the Code was entrusted to Jovan Hadžić, a Serbian jurist educated in the academic circles of the Habsburg Empire, who earned his doctorate in law from the University of Pest and subsequently completed his education in Vienna. His training in Roman law and his in-depth knowledge of the Pandectist tradition enabled him to draft a legal text that, while largely inspired by the Austrian ABGB, was not limited to a mere translation or transposition of the foreign model.

Contemporary legal historiography, in fact, agrees that the Serbian Civil Code of 1844 constitutes an independent work, in which various legal traditions converge. Alongside the strong influence exerted by the Austrian Civil Code, elements can be found that derive from Serbian customary law, Orthodox canon law, French law, and, to a more limited extent, Islamic law in force during the Ottoman period. This pluralism of sources reflects Serbia's complex historical evolution and its traditional position as a frontier between different cultural and legal spheres.

The Roman law influence of the Code is particularly evident in its systematic structure. It comprised 950 articles, organized into a three-part structure consisting of an introductory section, a section on personal rights, a section on property rights, and a third part concerning general provisions applicable to both personal relationships and property matters. Although this structure features adaptations from the classical model, it clearly echoes the well-known distinction formulated by Gaius in the *Institutiones* between *personae*, *res*, and *actiones*, which was subsequently adopted and reworked in the European legal tradition (Borkowski, 2015).

The adoption of the Code contributed to the spread within the Serbian legal system of certain fundamental principles of the Romanistic tradition, such as the protection of private property, the autonomy of the will, freedom of contract, and freedom to make a will. These legal institutions fostered the emergence of an individualistic conception of legal relationships, which stood in increasing contrast to the traditional communal organization of Serbian society, based on the zadruga a form of extended family cooperation that bore certain similarities to collective institutions known in Roman law.

Although the Code retained specific provisions dedicated to the family cooperative, the gradual rise in the value of individual property led to a slow process of transformation of traditional social structures, contributing to the formation of a modern civil society and the emergence of new economic relationships. The 1844 codification must therefore be interpreted not only as a legal phenomenon but also as an important factor in social and cultural change, capable of profoundly influencing the dynamics of Serbian modernization.

However, certain critical issues remain that reflect the transitional nature of nineteenth-century Serbian society. Among these, inheritance law is of particular significance, as it continued to incorporate customary norms that limited women's inheritance rights, excluding daughters from succession in the first order of inheritance under certain circumstances. These provisions attest to the persistence of patriarchal models deeply rooted in the local legal culture, despite the introduction of principles inspired by the Roman legal tradition and European legal liberalism.

Overall, the Serbian Civil Code of 1844 served as a decisive instrument for Serbia's integration into the continental legal family. Its promulgation facilitated the harmonization of the national system with contemporary European models and consolidated the presence of Roman law as a structural component of Serbian legal identity. The 19th-century codification experience thus demonstrates how the Roman law tradition continued to exert a significant influence well beyond antiquity, adapting to the needs of modern state-building and confirming its extraordinary capacity for historical renewal (Stein, 1999; Zimmermann, 1996).

A Legal Mosaic of Six Different Legal Territories in the Kingdom of Serbs, Croats, and Slovenes (1918–1941)

The end of World War I and the dissolution of Europe's multinational empires brought about profound transformations in the political and legal structure of Central and Eastern Europe. In this context, on December 1, 1918, the Kingdom of Serbs, Croats, and Slovenes was proclaimed later renamed the Kingdom of Yugoslavia in 1929 emerging as a new state characterized by significant ethnic, cultural, and legal diversity. One of the main challenges faced by the new state was the need to harmonize profoundly different legal systems, inherited from the previous state and imperial affiliations of the territories that had been incorporated into the new Kingdom (Glenn, 2014).

The phenomenon that characterized the initial phase of the construction of the Yugoslav state can be defined as genuine territorial legal pluralism, since the various regions retained the legal systems in force prior to unification. This resulted in the parallel coexistence of six distinct legal spheres, each with its own regulatory traditions, sources of law, and interpretive models. This situation represented a unique feature in the European landscape of the time, as legal systems derived from Roman, Germanic, customary, and religious traditions coexisted within a single state (Stein, 1999).

In the territory of Serbia proper, the Serbian Civil Code of 1844 continued to apply, remaining the primary legal framework governing private law relationships. In the region of Vojvodina, however, Hungarian law and regulations inherited from the Austro-Hungarian era were applied, while in the areas of Croatia, Slavonia, Dalmatia, and Slovenia, the Allgemeines Bürgerliches Gesetzbuch (ABGB) of 1811 remained in force, which reflected the Austrian legal tradition strongly influenced by the Roman law system (Zimmermann, 1996).

In Montenegro, the General Property Code for the Principality of Montenegro (Opšti imovinski zakonik), drafted by Valtazar Bogišić in 1888, remained in force; it is considered one of the most

original codification efforts in Southeast Europe. In Bosnia and Herzegovina, however, the legal system was even more complex, since alongside Austro-Hungarian-derived legislation, legal institutions rooted in Islamic tradition and Sharia law particularly relevant to the Muslim population continued to be applied, especially in matters of family and inheritance law (Ćirković, 2004).

The persistence of this legal pluralism highlighted the inherent difficulties of building a unitary state in a context marked by profound historical and cultural differences. The creation of a homogeneous legal system was repeatedly proposed as a priority objective, including through the development of drafts for a common civil code, but none of these efforts was brought to fruition before the outbreak of World War II. The failure to achieve legislative unification thus constituted one of the most significant aspects of Yugoslav legal particularism.

From a historical-comparative perspective, this experience is of particular interest because it demonstrates how the Roman law tradition has continued to serve as a unifying force in culture despite legal fragmentation. The Serbian Civil Code, the Austrian ABGB, and even certain Montenegrin legal developments shared conceptual categories and fundamental principles derived from Roman law, such as the centrality of private property, freedom of contract, the protection of obligations, and the systematic nature of property-related legal relationships (Wieacker, 1995).

The experience of the Kingdom of Serbs, Croats, and Slovenes also shows that the circulation of European legal models does not necessarily occur through linear processes of legal reception or replacement, but can develop through forms of coexistence and overlap between different traditions. From this perspective, Yugoslav legal pluralism can be interpreted as a historical laboratory for dialogue between legal systems, in which Roman law continued to serve as an organizing principle and methodological framework, while adapting to the social, economic, and political needs of a deeply diverse state (Glenn, 2014).

An analysis of this historical phase also allows us to understand how processes of legal integration are closely linked to the dynamics of national identity construction and to the definition of the relationship between institutional centralization and territorial autonomy. In this sense, the Kingdom of Yugoslavia represented a paradigmatic example of the tensions between political unity and legal diversity a phenomenon that continues to characterize numerous contemporary legal systems and confirms the enduring relevance of legal history and comparative law studies in understanding European legal systems.

The Development of Civil Law in the Federal Socialist Republic of Yugoslavia (1945–1991)

The end of World War II ushered in a new phase in the political and legal history of Serbia, which became part of the Federal Socialist Republic of Yugoslavia (FSRY) as one of its six constituent federal republics. The new institutional framework, based on the principles of self-management socialism, brought about profound transformations in the structure of private law, necessitating a rethinking of the traditional categories inherited from the Roman legal tradition and nineteenth-century codifications. However, despite the political will to build a legal system consistent with socialist ideology, the influence of Roman law did not completely disappear; it continued to manifest itself through legal institutions, principles, and legislative techniques that maintained significant continuity with the European civil law tradition (Stein, 1999; Zimmermann, 1996).

With the 1946 Law on the Nullity of Legal Provisions Enacted Before April 6, 1941, and During the Enemy Occupation, the Yugoslav legislature formally enacted the repeal of provisions predating the founding of the new socialist state. This decision was part of a broader process of economic and social transformation aimed at overcoming legal models considered to be expressions of the bourgeois legal order. Nevertheless, the legislation itself allowed for the residual application of provisions contained in the previous civil codes, provided they were compatible with the principles of the new political system and the needs of socialist society.

In judicial practice, this led to the indirect survival of numerous legal institutions derived from the Serbian Civil Code of 1844, the Austrian Allgemeines Bürgerliches Gesetzbuch, and the Montenegrin General Property Code, which continued to be used as interpretive criteria to fill gaps in the law. This was a particularly interesting phenomenon from a historical-legal perspective, as it demonstrates how the Roman law tradition managed to retain a systematic function even in contexts ideologically distant from the liberal model that had characterized its spread in the 19th century (Wieacker, 1995).

During the 1960s, the need arose to move toward a more comprehensive regulation of private law relationships. In this context, a commission was established to draft a new federal civil code, a project that, however, was never completed. The constitutional reforms introduced in the early 1970s, in fact, fostered a gradual decentralization of legislative powers, granting the individual federal republics authority over matters such as family law and inheritance law, while respecting regional specificities and the different legal traditions within the federation (Avramović, 2018).

Despite the failure to adopt a unified civil code, the socialist period was marked by the adoption of important legislative texts that would exert a lasting influence even in the post-Yugoslav era. Of particular note among these are the 1978 Law on Obligations (Zakon o obligacionim odnosima) and the 1980 Law on the Foundations of Property- e Relations (Zakon o osnovama svojinskopravnih odnosa), which are still considered today to be among the most significant expressions of the civil law tradition in Southeast Europe.

The 1978 Law on Obligations, drafted under the guidance of Professor Mihailo Konstantinović, represented one of the most advanced codifications of European private law in the second half of the 20th century. The work was influenced by a variety of legal models, including the Swiss Code of Obligations, the French Civil Code, the 1964 Uniform Law on the International Sale of Goods, and the preparatory work for the subsequent 1980 Vienna Convention on the International Sale of Goods. This comparative approach made it possible to develop a modern, flexible, and technically refined body of law capable of reconciling the Roman law tradition with the needs of a socialist economy open to international trade (Konstantinović, 1969).

Unlike other states belonging to the so-called Eastern Bloc, Yugoslavia maintained close trade relations with Western countries and with the emerging economies of the Non-Aligned Movement. This distinctive feature fostered the adoption of legal solutions aimed at promoting the efficiency of economic transactions and safeguarding legal certainty in contractual relationships. For this reason, the 1978 Law on Obligations has frequently been described in legal scholarship as one of the most successful European codifications of contemporary contract law, to the extent that it continues to be applied, with limited modifications, in numerous states that emerged from the dissolution of Yugoslavia (Pak, 1988).

In the area of property rights, however, the influence of socialist ideology was much more pronounced. The 1980 Law on the Foundations of Property Relations granted a privileged position to social ownership, which was considered the economic foundation of the Yugoslav self-management system. This led to a reduction in the centrality of private property, which,

however, was not abolished and continued to require specific legal regulation. In this context, many of the traditional categories developed by Roman law were adapted to the needs of the new economic model, while maintaining substantial continuity on a technical and conceptual level.

Despite the predominance of the collective interest and the emphasis on social property, the Roman legal tradition remained recognizable in the regulation of limited real rights, possession, adverse possession, and contractual relationships. This was an often unspoken but extremely significant continuity, confirming that Roman law retained a structuring function even within legal systems characterized by different ideological orientations. As noted by Reinhard Zimmermann, the persistence of Roman law categories attests to the extraordinary capacity of Roman law to adapt to profoundly different historical, economic, and political contexts, while retaining its methodological and systematic utility (Zimmermann, 1996).

The Yugoslav socialist period thus constitutes a paradigmatic example of the indirect reception of Roman law. Even within a legal system formally inspired by the principles of socialism, numerous fundamental institutions of private law continued to be structured according to conceptual categories developed within the European civil law tradition and, ultimately, traceable to the legacy of Roman law. This continuity helped facilitate, following the collapse of socialist Yugoslavia, Serbia's subsequent process of realignment with contemporary continental legal models and European regulatory standards.

The New Civil Code of the Republic of Serbia

The dissolution of socialist Yugoslavia and the gradual consolidation of the Republic of Serbia as a sovereign state have reignited the debate regarding the need for a new civil code capable of responding to the economic, social, and legal transformations that have taken place in recent decades. In this context, the drafting of a new Civil Code is not merely a matter of legislative technique but constitutes a project to redefine the nation's legal identity, aimed at reconciling continuity with the Roman law tradition, the preservation of solutions developed under Yugoslav law, and the requirements arising from harmonization with the legal system of the European Union.

With the severing of constitutional continuity with the Yugoslav state in 2003, the issue of a unified codification of Serbian private law resurfaced. An initial initiative came from academic circles, while in 2006 the Government of the Republic of Serbia formally established a Commission tasked with drafting the new Civil Code. The composition of the Commission consisting primarily of university professors of civil law, but also open to the participation of judges, attorneys, and legal professionals reflects the desire to develop a legislative instrument capable of integrating scholarly analysis with practical experience.

During the course of the work, several preliminary drafts were prepared and published in 2011, 2015, and 2019, respectively. The latest draft currently represents the most advanced version in the codification process and comprises 2,838 articles, accompanied by numerous alternative solutions submitted for scholarly and institutional debate. The structure adopted is explicitly inspired by the pandectist model that developed within the Germanic legal tradition and was enshrined in the German Bürgerliches Gesetzbuch of 1900, organized into five books devoted to the general part, obligations, property rights, family law, and inheritance law (Dudás, 2024). This approach highlights the enduring methodological influence of Roman law on the modern European civil law system, confirming that Roman legal categories continue to serve as an essential tool for the conceptual organization of contemporary private law (Zimmermann, 2001).

One of the most significant aspects of the project is the desire to preserve continuity with the national legal tradition. In particular, the 1978 Law on Obligations, unanimously considered one of the most successful legislative works in the former Yugoslav space, continues to form the fundamental core of Serbian contract law. This choice attests to the significance of the legal tradition that developed during the Yugoslav period and, at the same time, confirms the persistence of the legal categories developed from Roman law as filtered through modern European civil law. As noted by contemporary legal scholarship, the draft Serbian Civil Code thus presents itself as a model of evolutionary continuity, in which the Roman law heritage is combined with the needs for modernization and integration into European regulatory standards (Dudás, 2024; Popov, 2019).

At the same time, the process of drafting the new Civil Code is part of a broader framework of convergence with European Union law. Numerous proposed provisions are, in fact, influenced by the legislative experiences of France, Germany, and Switzerland, as well as by certain recent European and non-European codifications, including those of Romania, Hungary, Quebec, Brazil, and the Russian Federation. This comparative approach reflects a well-established trend in contemporary codification, oriented toward the search for legal solutions capable of ensuring high levels of legal certainty, economic efficiency, and the protection of fundamental rights.

The decision to adopt a pandectic structure is also consistent with the long Roman law tradition of the Serbian legal system. The central role given to general categories, the law of obligations, private property, and inheritance confirms the historical continuity with the process of adopting Roman law that began in the Middle Ages and was consolidated through the Civil Code of 1844. From this perspective, the new codification does not represent a break with the past, but rather the final stage of a long evolutionary process characterized by Roman law's ability to adapt to different historical contexts while maintaining its organizing and systematic function intact (Ignjatović, 2012).

Despite the progress made in the preparatory work, in 2019 the Serbian government decided to dissolve the commission tasked with drafting the Code, thereby postponing its final approval. Currently, the fate of the future codification remains uncertain and continues to be the subject of debate in Serbian legal scholarship. However, regardless of institutional developments, the project attests to the enduring vitality of the Roman law tradition in contemporary private law and confirms that Roman law continues to constitute a fundamental element of European and Serbian legal identity (Popov, 2019; Dudás, 2024).

Conclusions

An analysis of the historical evolution of Serbian law allows us to affirm that Roman law has represented one of the elements of greatest continuity in the construction of national legal identity. Its influence did not manifest itself through a linear and uniform process, but rather through different cycles of reception, adaptation, and reinterpretation, closely linked to the political, institutional, and cultural transformations that have characterized Serbia's history.

The first reception of Roman law, which took place in the Middle Ages through the filter of Byzantine law, contributed to the formation of a distinctive Serbian-Byzantine legal tradition, capable of integrating norms derived from the Roman heritage with institutions characteristic of local customary law. St. Sava's Nomocanon, Matthew Blastares' Syntagma, the Law of Emperor Justinian, and the Code of Dušan attest to the existence of a process of legal assimilation that was not limited to the mere translation of normative texts but gave rise to an autonomous and original reworking of the Roman-Byzantine tradition.

The second phase of legal reception, which took place in the 19th century with the adoption of the Serbian Civil Code of 1844, marked Serbia's entry into the continental European legal system. Through the mediation of the Austrian Civil Code of 1811, numerous principles of Roman law were incorporated into modern legislation, promoting the spread of the concepts of private property, freedom of contract, and testamentary succession. This process contributed decisively to the modernization of the Serbian state and to Serbia's gradual integration into the European legal tradition. Even during the Yugoslav period, despite the profound ideological transformations introduced by the socialist system, Roman law categories retained a significant capacity for adaptation. In particular, the 1978 Law on Obligations and the 1980 Law on the Foundations of Property Relations demonstrate how the principles developed by Roman law have continued to serve as a fundamental reference for the regulation of property and contractual relationships, ensuring stability and continuity in the civil legal system. The current debate regarding the adoption of a new Civil Code of the Republic of Serbia further confirms the enduring vitality of the Roman law tradition. The reform proposals developed in recent decades highlight the desire to preserve the nation's legal heritage while harmonizing it with the demands of globalization, economic modernization, and the process of European integration. The decision to adopt a pandect-style system and to maintain continuity with the main provisions of current civil law demonstrates how Roman law continues to play an essential organizing and methodological role in contemporary Serbian private law.

Ultimately, the Serbian legal experience shows that Roman law should not be considered merely a historical phenomenon belonging to the past, but rather a dynamic legal tradition that remains fully operational. Its ability to adapt to profoundly different political, economic, and social contexts confirms the universal nature of its principles and reaffirms its importance as a common cultural foundation of European civil law systems. The continuity between Roman law, the Serbian legal tradition, and future prospects for codification thus constitutes a significant example of the enduring relevance of the Roman legal heritage in the 21st century.

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Development and Codification of Private Law (Civil and Commercial Law) in Mexico and Central America

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Introduction

The countries of Central and South America, the vast majority of which were Spanish, Portuguese, French, British, or Dutch colonies, also preserved the Roman legal tradition in their private law in various ways. In these countries, Roman law formed the basis for legal scholarship (doctrine), was central to legal education at universities, and was applied on a subsidiary basis in legal practice. The development of private law in Latin America thus illustrates the remarkable continuity of the Roman legal tradition outside Europe and confirms the enduring significance of the ius commune for the emergence of modern civil law systems.

The study of private law codifications in Latin America is currently relevant not only from a historical and legal-theoretical perspective but also fits into ongoing discussions regarding the internationalization of scholarly research, the strengthening of interdisciplinary perspectives, and the promotion of comparative studies within the social sciences. In this context, it is emphasized that the analysis of historical legal institutions contributes significantly to the consolidation of scholarly networks, the promotion of innovative research approaches, and the further development of social science knowledge production in Latin America (Barros & Bores, 2024; Cárdenas-Palomino et al., 2024; Carlín-Chávez et al., 2025).

The development of private law in Mexico and Central America is also an expression of a comprehensive process of legal and cultural transfer, within which continental European codification models were adopted, adapted, and integrated with local legal traditions. Comparative legal research therefore regards the Latin American legal systems as an integral part of the Roman-Germanic legal family, whose common foundation lies in the reception of Roman law and its dogmatic further development (Zimmermann, 1996; Mirow, 2004).

In the codification of civil law in the 19th century, the French *Code civil* was of primary and decisive importance. In addition to the French *Code civil*, the General Land Law for the Prussian States (PALR), the Austrian General Civil Code (ABGB), the Dutch Civil Code of 1838, the German *BGB*, the Swiss Civil Code of 1907 and the revised Swiss Code of Obligations of 1911, as well as the Italian Civil Codes of 1865 and 1942, the Portuguese Civil Code of 1867 and the Spanish Civil Code of 1889 also had a significant influence on the codification of civil law in Central and South American countries.

In addition, Spanish colonial legislation was taken into account, particularly the *Recopilación de Leyes de Indias* of 1680, as well as the official compilations for the consolidation of Spanish private law, namely the *Nueva Recopilación* and the *Novísima Recopilación*. Likewise, until the adoption of the Spanish Código Civil, special attention was paid to the 1851 draft by Florencio García Goyena. At the same time, continental European private law doctrine and in particular the German Historical School of Law had a lasting influence on the scholarly development of private law in Latin America by contributing to a greater systematization of the legal order and to the reception of pandectist concepts (Guzmán Brito, 2013).

Justo Arosemena (1817–1896), a Romanist, constitutional lawyer, and codification expert from Panama which was then still a province of Colombia drafted a civil code whose terminology and structure were based in large part on the Justinian Code. Although this draft never became law in either Panama or Colombia, it exerted a significant influence on the codification of private law in Central and South America. Arosemena also advocated early on for the convergence and integration of Latin American legal systems based on their shared Roman law tradition and the codification experiences of continental Europe. The shared legal culture rooted in Roman law remains to this day an essential foundation for various integration efforts in the field of private law and, in particular, private international law, of which the Código Bustamante is a significant example.

During the 19th century, independent commercial codes (códigos de comercio) were enacted in the countries of Central and South America, predominantly modeled after the French system. As a result of the development of separate commercial law codifications, the dualistic system which distinguishes between civil law and commercial law has remained predominant in most Latin American legal systems to the present day. This development illustrates the ability of the Roman legal tradition to adapt to different social and economic conditions while preserving its fundamental dogmatic structures.

Finally, it is also worth noting the lesser-known fact that the ius Romanum continues to exert an indirect influence in those parts of Antarctica over which Argentina and Chile assert territorial claims, even though these claims are not generally recognized under international law. This unique feature underscores the extraordinary historical influence of Roman law as well as its significance as a common foundation for numerous private-law cultures both within and outside Europe.

Mexico

Mexico's first constitution, promulgated in 1824, authorized the Mexican federal Congress only to regulate bankruptcy law (derecho de quiebras) at the federal level. Accordingly, legislation in the area of private law fell within the jurisdiction of the individual states (Zimmermann, 1996; Mirow, 2004). territories.

The first civil code in Mexico was the Código civil of the state (Estado libre) of Oaxaca, which came into force in sections between 1827 and 1829. In terms of its structure and content, it followed the French Code civil. However, this civil code remained in force only for a short time until 1837. The state's second Civil Code was adopted in 1852 (Ortiz-Urquidi, R., 1974).

The two subsequent Mexican civil codes, enacted in 1870 and 1884, were formally applicable only to specific territories; however, they were applied by the courts throughout Mexico. In both codes, the direct influence of Roman law is evident only to a limited extent (Macedo, 1971). The 1870 Code was based on a draft by Justo Sierra. It was applicable only in the Federal District (Distrito Federal de México) and in the territory of Baja California. The sources of this Civil Code were the principles of Roman law, Spanish colonial legislation (legislación colonial), the French Code civil, the Austrian General Civil Code (ABGB), the Civil Code of Piedmont, the first Dutch Burgerlijk Wetboek of 1838, and the 1851 draft of a Spanish Código civil (Concordancias, motivos, y comentarios del Código civil español) by Florencio García Goyena (Guzmán Brito, 2000).

The territorial scope of the 1884 Código civil corresponds to that of the 1870 version. In terms of content, however, the adoption of this new Código civil should be viewed more as a minor reform of private law.

Worth noting is the unique feature of Mexico that, since the establishment of the presidential federal republic in 1917 the introduction of the federal structure dates back to 1823 each of the 29 states (Estados), the two territories (Territorios), and the Federal District of Mexico (Distrito Federal de México) have adopted their own civil code at different times. It should be noted here that the federal government's (federación) legislative authority must be expressly established in the Constitution. With a few exceptions, the regulation of civil law falls within the jurisdiction of the states or the Federal District. However, these 32 civil codes are almost entirely consistent with one another in terms of content and structure, a fact attributable to the fact that the Civil Code of the Federal District (Código civil para el Distrito Federal) of 1928 served as a model for the civil codes drafted later. The minor differences that often exist between the civil codes stem primarily from the need to take local conditions into account.

The Civil Code for the Federal District came into effect in 1932 and underwent extensive revisions in 1965 and 1977. In its drafting, particular consideration was given to the Austrian General Civil Code (ABGB) (including its three partial amendments), the German Civil Code (BGB), the Swiss Civil Code, the Italian Civil Code (1865), the Portuguese Civil Code (1867), and the Franco-Italian draft law on contracts and obligations from 1927. Structurally, this Civil Code consists of introductory provisions (Art. 1–21) and four books: Personal and Family Law (Art. 22–476), Property Law (Art. 477–1181), Succession Law (Art. 1182–1791), and the Law of Obligations (Art. 1792–3074) (Mirow, 2014).

The civil codes currently in force in Mexico can be divided into four groups:

a) the statutes of those states (Estados) that have adopted the Civil Code of 1928 in its entirety. This applies to the majority of states (Estados);

b) those codes that have adopted the Civil Code of 1928 with modifications;

c) those codes based on the 1884 Civil Code; and

d) those codes that take both of the aforementioned codes into account equally.

The Constitution of 1857 authorized Congress, in the area of commercial law, only to enact the principles (principios) of commercial legislation. In order to regulate commercial law uniformly at the federal level, a constitutional amendment was required, which took place in 1883 and 1884. In contrast to civil law, commercial law (derecho mercantil) is today governed by a uniform federal commercial code, which was enacted in 1889 (Pargendler, 2012).

The Commercial Code has been amended several times since then. In addition, a law on commercial companies (Ley General de Sociedades Mercantiles) was enacted in 1943. This law also recognized irregular commercial companies. The 1943 law was amended in 1980 and 1982. Among other things, the amendments modified bankruptcy law (derecho de quiebras) and maritime law (derecho marítimo).

Mexico enacted the Consumer Protection Act (Ley de Protección al Consumidor) in 1976. Copyright law was first enacted in 1956. This law was substantially amended a few years later, in 1963.

Costa Rica

In Costa Rica (Republic of Costa Rica), which gained its independence in 1838, a General Code (Código General) was enacted in 1841, which regulated not only private law but also criminal law as well as civil and criminal procedure law. In terms of its structure, the Código General bore a certain resemblance to the General Land Law for the Prussian States (PALR). It cannot be ruled

out that the drafters of the Código General were influenced by the Prussian legal code (General Land Law for the Prussian States of 1794). In the private law section of this Código General which should be regarded as a national peculiarity the influence of the first Bolivian Código civil from 1830 is clearly evident (Jiménez, p. 1874).

In contrast to the General Code (Código General), the first actual Civil Code of 1886, which entered into force in 1888, covers the traditional subjects of private law. This code is also rooted in European private law traditions. The Civil Code of Costa Rica is primarily influenced by the French Civil Code and the draft of the Spanish Civil Code. It remains in force today, though it has undergone numerous amendments. This applies primarily to family law, which has been regulated in a separate code since 1973 but is formally part of the Civil Code (Zimmermann, 1996; Guzmán Brito, 2000).

Costa Rica's first Commercial Code was enacted in 1853. The Código de Comercio was originally divided into four books. Following an amendment on July 28, July 1853, the Costa Rican Commercial Code consisted of five books: Book One: On Merchants; Book Two: On Commercial Contracts in General, Their Forms, and Effects; Book Three: On Maritime Trade; Book Four: On Bankruptcy; Book Five: On Jurisdiction in Commercial Matters.

Commercial law in Costa Rica is governed by the Commercial Code (Código de comercio), which dates from 1964 and has been amended several times since then. The 1950 Honduran Commercial Code (Código de comercio) served as the primary model for the 1964 Código de comercio. The drafters of the currently valid Costa Rican Commercial Code also took into account Italian, Mexican, and Spanish commercial law legislation. A far-reaching reform or revision of corporate law (derecho de sociedades comerciales) took place in 1990 (Pargendler, 2012).

In the area of maritime law (derecho marítimo), Book Three of the Commercial Code from 1853 remains in force.

In Costa Rica, there is no apparent trend or movement toward overcoming the dualism between civil law and commercial law. The Constitution of Costa Rica, promulgated in 1949, contains no provisions regarding private law.

El Salvador

The territory of present-day El Salvador became part of the Captaincy General of Guatemala (Capitanía General de Guatemala) in 1542. El Salvador proclaimed its independence on September 15, 1821. El Salvador finally attained its sovereignty (independence) more than a decade later, on April 13, 1839, upon withdrawing from the Central American Confederation.

In El Salvador, the first civil code modeled on the Chilean Código Civil was drafted in 1859 and enacted the following year, in 1860. This civil code reflects the influence of the French Code Civil and Spanish colonial legislation (Mirow, 2004; Guzmán Brito, 2000).

The development of Salvadoran private law must be understood within the context of the general codification movements of the 19th century in Latin America. As in other countries in the region, the creation of a national civil code not only pursued the goal of legal unification but also served as an essential instrument for the consolidation of the young nation-state. The adoption of Andrés Bello's Chilean model enabled the integration of Roman law principles into the national legal system and contributed to the development of a systematic doctrine of private law.

It is particularly noteworthy that, despite numerous reforms, the Salvadoran Civil Code has largely retained its original doctrinal structure. This illustrates the stability of those private law concepts based on the continental European legal tradition. The amendments made throughout the 20th century were primarily aimed at adapting national law to social and economic changes, without, however, calling into question the fundamental principles of codified private law.

Of the numerous modifications in the 20th century, the amendments of 1902, 1928, 1937, 1955, and 1957 are undoubtedly the most significant. In drafting these amendments, the drafters primarily drew upon the German Civil Code (BGB), the Swiss Civil Code (ZGB), the Swiss Code of Obligations (OR), and the Italian Civil Code of 1942 (Duve, 2014).

A continuous evolution can also be observed in the field of commercial law, which was linked to the country's increasing economic modernization. The enactment of the Commercial Code of 1970 and the Labor Code of 1972 reflects an effort to adapt the legal framework to the requirements of a modern economic and social state while preserving the continuity of the continental European legal tradition.

Commercial law is currently governed by the Commercial Code (Código de comercio) of 1970, which entered into force the following year, in 1970. The Labor Code (Código del derecho de trabajo) was promulgated and enacted two years later, in 1972 (Mendoza-Orantes, 1991).

Honduras

The territory of present-day Honduras (Republic of Honduras) belonged to the Spanish Captaincy General (Capitanía General) of Guatemala during the colonial period. In 1821, the Central American provinces of the Captaincy General of Guatemala proclaimed their independence and, in 1822–1823, joined the Mexican Empire under Emperor Agustín I (1822–1823).

The following year, the Central American provinces seceded from Mexico, and the Central American Confederation was established. Between 1824 and 1838, Honduras was part of the United States of Central America (Central American Confederation). Honduras gained its independence in 1838.

Honduras's first Civil Code was promulgated in 1880 under the liberal government of President Marcos Aurelio Soto (1876–1883). This Civil Code was particularly heavily influenced by the Chilean Civil Code. The Civil Code was replaced in 1898 by a new Civil Code, which was practically, de facto, identical to the Spanish Civil Code of 1889. This Civil Code, consisting of a preliminary title and four books, entered into force in September 1899 (Guzmán Brito, 2000).

The third Civil Code, which remains in force today, dates from 1906 and essentially represents a return to Andrés Bello's Chilean Código civil. The Civil Code of 1906 has undergone only minor changes since then. No extensive reform of the Code has taken place.

The Commercial Code of 1898, consisting of four books and 942 articles, which took effect the following year, was modeled after the French Code de commerce. The third book of this Código de comercio governed maritime law and maritime trade law (comercio marítimo).

The Commercial Code, which remains in force today, was promulgated in 1950. The Commercial Code of 1950 reflects both continental European and Latin American influences. The Código de Comercio has since been amended several times, particularly with regard to commercial companies (sociedades comerciales). The Honduran Commercial Code served as a model for the Costa Rican Código de Comercio of 1964. The Constitution of Honduras, promulgated in 1982, contains no provisions regarding private law.

Nicaragua

Nicaragua proclaimed its independence on September 15, 1821. Nicaragua finally attained its sovereignty (independence) more than a decade later, on April 13, 1839, upon withdrawing from the Central American Confederation. The Constitution currently in force was promulgated and enacted in 1987.

Nicaragua's (Republic of Nicaragua) first Civil Code was adopted in 1867. The Civil Code of Andrés Bello served as the model for Nicaragua's first Código civil. The second Civil Code of 1871 was also significantly influenced by the Chilean Código civil. This Civil Code was replaced by the Código civil of 1904. The Civil Code of 1904 was shaped by both continental European and Latin American influences. The Argentine Civil Code by Dalmacio Vélez Sarsfield, which entered into force on January 1, 1871, exerted a particularly strong influence on this code (Zimmermann, 2011).

The development of Nicaraguan private law illustrates the special position of the Latin American codification movement within the Roman law tradition. The adoption of Andrés Bello's Chilean model was not merely a matter of incorporating normative content; it also signified Nicaragua's integration into a broader legal sphere shaped by shared doctrinal foundations, particularly the Roman law tradition (Zimmermann, 2009).

The incorporation of continental European influences into the Civil Code of 1904 further contributed to a greater systematization of private law and enabled the adaptation of traditional legal institutions to the social and economic transformation processes of the early 20th century.

The long-term validity of the 1904 Civil Code can also be interpreted as an expression of remarkable institutional continuity. Despite political upheavals, economic crises, and repeated constitutional amendments, private law remained a stabilizing factor within the legal system. In this context, it becomes clear that the codification of private law in Nicaragua not only fulfilled a historical function but continues to this day to represent an essential element of the state's legal identity and normative coherence (Duve, 2018).

The comprehensive revision of the 1904 Civil Code, which began in 1929, has still not been completed. This rather peculiar phenomenon can be explained by the country's difficult and volatile political situation. The Constitution, promulgated on January 9, 1987, and revised several times since then, left the Civil Code in force.

The Commercial Code, adopted in 1916 and enacted the following year, was thoroughly reformed in 1949. The Código de Comercio has been amended only a few times since then (Antillón, W., 1986).

Panama

The territory of present-day Panama (Republic of Panama) was a Spanish colony until the proclamation of independence on November 28, 1821. Panama joined Gran Colombia on the same day. Its secession from Colombia was declared on November 3, 1903.

The first Panamanian Civil Code was enacted in 1860. This Código Civil follows the Chilean Civil Code by Andrés Bello. The original Código Civil drafted by Justo Arosema, which largely followed the model of the Justinian Code, never became law.

Panama, which belonged to Colombia until 1903, enacted its Civil Code which remains in force today in 1916. It is heavily influenced by the Chilean Civil Code of 1855.

Justo Arosema drafted a Código de comercio (Commercial Code), but, like the draft Código civil (Civil Code) he had also prepared, it was never enacted.

The Commercial Code (Código de comercio) also came into force in 1916. In 1927 and 1946, it was amended by two laws on commercial companies (sociedades comerciales). The Commercial Code has been modified several times since then. The Constitution of Panama, promulgated in 1983, contains no provisions regarding private law (Pereira, 1992).

Guatemala

The first Civil Code of Guatemala (República de Guatemala), which gained its independence in 1821, dates back to 1877. Guatemala's first Civil Code was replaced in 1933 by a new Código civil. In 1963, yet another new Civil Code was promulgated, which came into force the following year. The drafters of this (third) Civil Code drew primarily on the French Code civil and the Spanish Código civil. Guatemala's Código civil also shows influences from the Peruvian Civil Code of 1936.

The development of Guatemalan private law is also an expression of a broader Latin American codification process, in which the adoption of continental European models was understood as a tool for institutional modernization and the consolidation of state structures. In this context, clear connections can be identified to the Iberian legal culture as well as to the Roman law tradition, which continues to serve as the common dogmatic foundation of Latin American private law systems (Zimmermann, 1996; Duve, 2014). The 1963 codification particularly strengthened the systematization of property law, inheritance law, and the law of obligations, and helped preserve the coherence of Guatemalan civil law within the continental legal tradition. At the same time, the development of Guatemalan private law demonstrates the ability of Latin American legal systems to selectively adapt foreign legal models and tailor them to national social, economic, and institutional conditions.

In 1970, a Commercial Code was enacted, which entered into force the following year. Guatemala's Código de Comercio has been amended several times, particularly with regard to the regulation of commercial companies (sociedades comerciales).

The Guatemalan Constitution, which entered into force in 1986 and was amended by a referendum (plebiscite) on January 1, 1994, contains no provisions regarding the country's private law system. Nevertheless, the historical separation between civil law and commercial law has persisted, meaning that Guatemala continues to follow the dualistic model of private law prevalent in Latin America.

Conclusions

The development of private and commercial law in Mexico and Central America illustrates the extraordinary durability of the Roman law tradition within the Latin American legal systems. Despite the political upheavals of the 19th century, the dissolution of colonial structures, and the emergence of sovereign nation-states, Roman law remained an essential frame of reference for legal education, legal scholarship, and codification movements in the region.

The analysis shows that the civil law codifications of Mexico, Costa Rica, El Salvador, Honduras, Nicaragua, Panama, and Guatemala cannot be understood as isolated normative constructs, but rather as the result of a complex process of reception, adaptation, and transformation of

European legal models. In addition to the French Code civil, the Spanish Código civil, the Austrian ABGB, the German BGB, the Swiss Civil Code, and continental European legal doctrine in particular had a formative influence on the shaping of national private law systems.

Of particular significance is the role of codification as an instrument of state consolidation and institutional modernization. The creation of national civil and commercial codes not only represented a step toward the unification of the law but also served to integrate diverse legal traditions and societal needs. Furthermore, several countries in the region exhibit a remarkable continuity of codification models, whose basic structures persist to the present day, albeit with adjustments to account for new social, economic, and constitutional requirements.

The study further makes it clear that, in the area of commercial law, the dualistic model has largely been preserved, in which civil and commercial law continue to be regulated separately. This development differs from the trends in some European legal systems, which strive for greater unification of private law, and underscores the independence of Latin American legal development.

Finally, the historical analysis confirms that the Romanistic tradition continues to form a central component of the legal identity of Mexico and Central America. It serves not only as a common cultural and doctrinal foundation for national legal systems but also as an important point of reference for current discussions on the harmonization, modernization, and regional integration of private law in Latin America. In this sense, the ius Romanum remains a living element of the continental legal tradition, whose influence extends far beyond the period of its historical origins.

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At the Roots of Gender Discrimination

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Introduction

The modern achievement of formal equality between men and women has not automatically led to the attainment of full substantive equality. In fact, multiple forms of gender discrimination persist and continue to manifest themselves in the family, workplace, economic, and social spheres, often closely linked to the persistent attribution to women of a dual role that of production and that of reproduction. The persistence of these disparities highlights how numerous cultural models related to motherhood, female sexuality, and the division of social roles have deep historical roots, traceable to normative and symbolic structures developed as far back as the ancient world (Elias, 1987; Suárez Blázquez, 2023).

Historical analysis allows us to understand that gender discrimination is not exclusively a contemporary phenomenon but rather the result of cultural and legal processes that have developed over the centuries. From this perspective, Roman law plays a pivotal role as a historical laboratory for the construction of female identities, since many of the categories that have influenced the European legal tradition find their origin or one of their most significant elaborations within it. The legal subordination of women was shaped by institutions such as patria potestas, manus, and tutela mulierum instruments that helped define a model of differentiated citizenship based on gender and justified through conceptual categories such as infirmitas sexus and levitas animi (Del Castillo, 2010; Barreiro Morales, 2025).

Contemporary research in the social sciences also highlights the need to develop interdisciplinary approaches capable of integrating historical, legal, social, and cultural perspectives into the analysis of the dynamics of exclusion and persistent forms of inequality. In this regard, recent studies emphasize that examining the historical processes of constructing collective identities and power relations is an essential tool for understanding the continuity of discriminatory phenomena in contemporary societies (Barros & Bores, 2024). At the same time, the latest trends in university research emphasize the importance of multidisciplinary methodologies that enable a critical interpretation of social and cultural transformations, fostering the integration of historical, educational, and legal perspectives in the study of inequalities and their contemporary manifestations (Cárdenas-Palomino et al., 2024).

From the earliest times, Roman women were placed within a highly hierarchical family structure, in which, as filia familias, they were subject to their father's authority; once married, they could find themselves subject to their husband's manus, and even if they became sui iuris, they generally continued to be assisted by a guardian. The legal construction of the female figure was thus embedded in a family model founded on the centrality of the domus and on the social function of marriage, understood not only as a private union but also as an institution serving to preserve the family, property, and the civic community (Fernández Baquero, 2012; Rodríguez González, 2019).

Roman social order assigned women a specific behavioral model, defined through the categories of chastity, modesty, pietas, obedience, and devotion to the domestic sphere. To be recognized and socially valued, a woman had to conform to an ideal developed primarily by a male-dominated legal and political culture, accepting a marriage arranged by her family, ensuring the

biological continuity of the gens and the civitas, and fulfilling her duties as a wife and mother in accordance with the mores maiorum. Motherhood, in particular, transcended the private sphere to take on clear public significance, as an instrument for the preservation of the community and the transmission of traditional values (Suárez Blázquez, 2023).

This social model was significantly reaffirmed during the Augustan principate, when the political project of moral restoration promoted by Augustus sought to revive traditional virtues and reestablish a family ethic inspired by the strictness of ancient customs. Through marriage and population legislation, the emperor sought to encourage childbearing, counteract the decline in births, and reaffirm the centrality of the family as a pillar of social and political stability. However, the social reality of the late Republic and the Imperial Age had undergone profound changes compared to the past, as women had gradually acquired greater economic autonomy thanks to the expansion of sine manu marriages, the availability of personal assets, and the gradual weakening of the institution of guardianship (Del Castillo, 2010).

Literary and legal sources also show that motherhood was conceived as an indispensable moral duty, the failure to fulfill which could be interpreted as a deviation from the natural and social order. The words attributed by Gellius to Favorinus regarding the maternal obligation of breastfeeding constitute an emblematic example of this conception, in which the ideal woman is portrayed as one who not only bears children but also raises them personally, thereby ensuring the full fulfillment of her natural role. This cultural representation of the perfect mother would endure through the centuries, reemerging in modern medical and religious treatises and contributing to the construction of stereotypes that continue to influence society's perception of motherhood and women's reproductive choices to this day (Elias, 1987).

The study of the historical roots of gender discrimination thus highlights the remarkable continuity of certain cultural paradigms which, while changing over time, have retained a significant capacity to influence contemporary social relations. The study of Roman sources is therefore not merely an academic exercise but serves as an indispensable tool for understanding the historical processes of the construction of female identities, gender inequalities, and the persistent tensions between formal and substantive equality that still characterize contemporary societies.

From this perspective, the interdisciplinary approach promoted by contemporary studies in the social sciences and in the field of Science, Technology, and Society highlights the importance of linking historical analysis to current issues, fostering a broader understanding of persistent gender asymmetries and the cultural processes that contribute to their reproduction in contemporary societies (Quiroz-Valdez et al., 2025).

At the Roots of Gender Discrimination

The modern achievement of legal equality between men and women has not automatically led to the elimination of the substantive inequalities that continue to characterize many contemporary societies. Gender discrimination persists in various forms and often manifests itself through deeply rooted social expectations regarding motherhood, family, caregiving, and women's work. These dynamics seem to have their origins in cultural models developed over the centuries, some of which are already significantly articulated in Roman legal thought.

From this perspective, Roman law serves as a key tool for understanding the historical construction of female identities and the social roles attributed to women (Suárez Blázquez, 2023; Del Castillo, 2010).

From the earliest periods of Roman civilization, women's status appears to have been defined within a family system characterized by a strong hierarchical structure. As filia familias, a woman was subject to the patria potestas exercised by the pater familias; subsequently, in a marriage cum manu, she could become part of her husband's family, assuming a legal status comparable to that of a daughter. Even in situations where a woman became sui iuris, her autonomy was nonetheless limited by the institution of tutela mulierum, traditionally based on the notions of infirmitas sexus and levitas animi categories that for a long time served as a theoretical justification for women's inability to fully manage their own interests (Fernández Baquero, 2012; Barreiro Morales, 2025).

The feminine model developed by Roman society was not, however, limited to defining a subordinate legal status; it also prescribed a specific ethical and behavioral ideal. A respectable woman was expected to be chaste, modest, obedient, hardworking, and entirely devoted to the domestic sphere. The domus, in fact, represented the primary setting for her personal and social fulfillment, while marriage and motherhood took on an importance that transcended the private sphere to become essential elements of political stability and the continuity of the civic community. Motherhood, therefore, was not considered exclusively an individual experience, but rather a function of collective interest, closely linked to the preservation of the family and the civitas (Rodríguez González, 2019).

In this context, the centrality attributed to female fertility takes on particular significance. The ability to bear children was interpreted as a social, familial, and political value, so much so that a woman who adhered to the traditional model attained the highest recognition permitted by Roman society: that of materfamilias honorata. This recognition entailed not only the prestige derived from motherhood but also the opportunity to play a fundamental role in transmitting moral, religious, and civic values to future generations. Women thus became the custodians of the mores maiorum, while remaining embedded in a social structure in which norms and behavioral models continued to be developed and defined primarily by men (Suárez Blázquez, 2023).

The persistence of these cultural representations beyond the confines of antiquity appears particularly significant. Many of the stereotypes regarding motherhood, the duty of care, and women's educational responsibilities have spanned the Middle Ages, the modern era, and the contemporary age, taking on different forms while retaining the same cultural foundation. In this sense, the Roman experience seems to constitute one of the founding moments of a long-lasting paradigm, in which women's social recognition is subordinated to adherence to preestablished models of behavior, motherhood, and family life (Elias, 1987).

Motherhood as a Social and Legal Construction: Models of Female Behavior from Ancient Rome to Modernity

The cultural construction of motherhood in Roman society does not appear to be reducible to a merely private or emotional dimension, but rather emerges as a structural element of the civic and family order. Roman women were evaluated primarily on the basis of their reproductive capacity and their ability to transmit values, customs, and educational models in accordance with the mores maiorum. Motherhood thus assumed an eminently public function, as it contributed to the preservation of the political community through the biological and moral reproduction of citizenship. From this perspective, the female body became a space of collective interest, subject to regulatory controls and social expectations that transcended the individual sphere (Dixon, 2001; Hemelrijk, 2021).

The exaltation of motherhood as a civic duty finds particularly significant expression in Augustan legislation. The leges Iuliae and the lex Papia Poppaea did not, in fact, merely encourage childbirth but promoted a specific feminine ideal, founded on fertility, marital fidelity, and the fulfillment of domestic duties. A woman's social recognition was closely linked to her ability to embody the model of the materfamilias, a figure who epitomized moral virtues, family continuity, and educational responsibility. Motherhood, therefore, became an instrument of political integration and social discipline, in which the interests of the state coincided with those of the family (Fayer, 2005; Gardner, 1991).

In this context, Favorino's reflections, as reported by Gellius, attest to the existence of a normative discourse aimed at defining not only the obligation of motherhood but also the ways in which it was to be exercised. Breastfeeding was presented as a natural continuation of pregnancy and as an essential component of the mother-child relationship. The refusal to breastfeed personally was interpreted as a failure to fulfill the maternal role, a behavior contrary to nature and, indirectly, to the social order itself. Ideal motherhood was thus shaped according to parameters established primarily from a male perspective, which assigned specific tasks to women and limited their possibilities for self-determination (Cantarella, 2009).

The interest sparked by Favorino's text, however, transcends the Roman context and allows us to grasp the historical persistence of normative representations of motherhood. The almost literal repetition of his arguments in Girolamo Mercurio's sixteenth-century treatise demonstrates the ability of certain cultural models to span different eras, religious systems, and social contexts. Motherhood continues to be conceived as a natural and moral duty of women, while the choice not to have children or to delegate their care is frequently interpreted as a deviation from a paradigm considered universally valid. This highlights how certain forms of contemporary discrimination are rooted in cultural representations developed as far back as antiquity and subsequently reinterpreted through Christian, medical, or social lenses (Milnor, 2006; Harlow & Laurence, 2002).

The "transfer of wives": Between reproductive function, social control, and the legal construction of the female role

The report regarding a husband's ability to " " his wife so that she might bear children for another man constitutes one of the most debated topics in contemporary Roman legal history. Although some scholars have expressed reservations regarding the actual existence of a " " for this practice as a legally recognized institution, the convergence of ancient sources suggests, at the very least, the existence of a cultural model in which a woman's reproductive capacity could be considered a resource capable of assuming public and familial significance. From this perspective, women appear to have been embedded in a patrimonial and communal framework in which procreation transcended the individual sphere to be subsumed under the interests of the gens and the civitas (Gardner, 1991; Treggiari, 1991).

The centrality attributed to motherhood in Roman society explains the attention paid to female fertility and the continuity of aristocratic families. In a social system in which the transmission of wealth, family name, and prestige depended on the presence of legitimate descendants, the ability to bear children took on a function of primary importance. It is therefore not surprising that certain practices now perceived as incompatible with the principle of personal self-determination could be justified through interpretive frameworks based on the common good, family solidarity, or the interests of the political community. Within this framework, the female

body continued to be subject to social regulation, an expression of a legal order deeply marked by asymmetrical power relations (Cantarella, 2010).

The story of Marzia is probably the most emblematic example of the complexity of the relationships between individual will, male authority, and the reproductive function. Ancient sources, in fact, present a female figure who seems to accept her role within a value system in which personal sacrifice is interpreted as an expression of virtue and family devotion. However, apparent adherence to an imposed model does not necessarily allow us to speak of a fully free choice, since it is situated within a social structure characterized by cultural constraints and collective expectations that are difficult to evade. The ability to distinguish between formal consent and genuine decision-making autonomy remains, even today, one of the main interpretive challenges in the study of the legal status of women in antiquity (Dixon, 2001).

Marzia's story also invites reflection on the historical persistence of social representations that attribute to women primary responsibility for preserving the family and reproducing the community. Many of the contemporary stereotypes regarding motherhood, female sacrifice, and the subordination of personal aspirations to the needs of the family seem to find significant antecedents precisely in the cultural constructs of the Roman world. An analysis of ancient sources therefore allows us not only to understand the dynamics of the past but also to identify the historical roots of discriminatory patterns that continue to manifest themselves, albeit in different forms, in contemporary societies (Hemelrijk, 2021; Milnor, 2005).

Marzia: Between Consent, Subordination, and the Construction of the Model of the Materfamilias Honorata

The story of Marzia represents one of the most significant examples for understanding the ways in which Roman society developed and consolidated a feminine ideal based on voluntary subordination to the interests of the family and the community. The narrative handed down by the sources appears, in fact, to present a woman who accepts without opposition decisions that profoundly affect her personal and marital life, in accordance with a value system in which the good of the family takes precedence over individual aspirations. However, adherence to a socially imposed model cannot automatically be interpreted as an expression of full freedom of decision-making, especially in a society in which the education of women was oriented from childhood toward the internalization of rigidly defined roles and behaviors (Dixon, 2001).

The image of Marzia conveyed by ancient sources appears consistent with the paradigm of the materfamilias honorata that is, a woman who achieves social recognition by meeting the expectations set forth by the dominant male-centered culture. Feminine virtue is identified with a willingness to make sacrifices, with the ability to subordinate one's own will to the needs of family continuity, and with the acceptance of motherhood as the primary function of one's social existence. In this sense, the prestige attributed to the materfamilias does not necessarily imply the recognition of genuine autonomy, but rather the conferral of an honorary status subordinate to conformity with behavioral models established by others (Cantarella, 2010).

Furthermore, the discussions that have arisen in the modern and contemporary eras surrounding the figure of Marzia attest to the interpretive complexity of the sources. Roman legal historiography has long debated whether to view this episode as an expression of free choice or as a manifestation of a patriarchal culture in which women's consent was inevitably conditioned by the social context. The interpretive difficulty also stems from the absence of direct testimony from women themselves, a circumstance that forces legal historians to engage with narratives

produced almost exclusively by male authors, who held values and conceptual categories specific to their own era (Hemelrijk, 2021).

From this perspective, Marzia's case takes on a significance that transcends the historical and legal dimensions of ancient Rome. Indeed, it allows us to reflect on the persistence of cultural models that continue to valorize female sacrifice as a constitutive element of motherhood and family life. The portrayal of women as individuals called upon to find fulfillment primarily through caregiving, childbearing, and devotion to others constitutes one of the cultural foundations of contemporary gender discrimination, often characterized by less explicit but no less incisive forms of limitation on personal self-determination (Milnor, 2005).

The Interpretations of Astolfi, Gaudemet, Flacelière, and Guarino:

Between Stoicism, Family Strategy, and Female Subordination

The various interpretations developed by contemporary scholarship regarding the story of Marzia highlight the complexity of the relationship between legal norms, social practices, and cultural representations of women in the Roman world. The discussion concerns not only the technical classification of marriage or ownership of the manus, but also touches on deeper issues regarding the meaning attributed to female consent, the reproductive function, and the position of women within the Roman family. The plurality of proposed interpretations demonstrates how the same episode can be interpreted both as a manifestation of a logic of solidarity oriented toward family continuity and as an expression of a social system in which women's autonomy was inevitably subordinate to male decisions (Gardner, 1991).

The interpretation proposed by Astolfi emphasizes above all the technical and legal aspects of the institution, identifying in the episode a possible exercise of the powers deriving from the *manus*. From this perspective, the centrality of the woman's will appears diminished, since the family structure would be dominated by the authority exercised by the holder of *potestà*. This reconstruction helps to highlight how, despite the evolution of marital models that took place during the late Republican period, the status of women continued to be deeply influenced by normative structures designed to preserve the patriarchal order and the stability of the Roman family (Fayer, 2005).

Gaudemet takes a different position; according to him, the story could be interpreted within the context of a sine manu marriage, a circumstance that would give greater weight to the woman's will and her ability to participate, at least formally, in decisions concerning her married life. However, even if one accepts this perspective, the question of the woman's actual freedom of choice remains open. The pressure exerted by social expectations, family prestige, and adherence to traditional values makes it difficult to distinguish between legally valid consent and authentic personal self-determination. In this sense, Marzia's story continues to serve as a paradigmatic case for reflecting on the limits of women's freedom in ancient societies (Dixon, 2001).

The debate surrounding the interpretations of Flacelière and Guarino appears particularly significant. The former identifies Stoicism as the key to interpreting Cato's behavior, highlighting the subordination of individual inclinations to a higher ideal of virtue and collective utility. Guarino, on the other hand, proposes a more problematic and disenchanted reading, hypothesizing personal, emotional, or financial motivations that distance the story from the idealized image handed down by tradition. Beyond the different solutions proposed, both interpretations confirm that the female figure continues to be portrayed predominantly through

perspectives developed by men, in which women assume the role of objects of decision-making, symbols of virtue, or instruments of familial and social strategies (Cantarella, 2010; Hemelrijk, 2021).

The Historical Persistence of Models of Female Subordination: From Roman Sources to Contemporary Discrimination

An analysis of Roman sources reveals how many of the cultural models relating to the status of women have endured over the centuries, maintaining a striking continuity in the definition of the roles assigned to women within the family and society. Although legal transformations throughout history have progressively granted women greater rights and greater autonomy, symbolic representations that tend to associate women's social value with motherhood, a willingness to make sacrifices, and the ability to balance family responsibilities with work still persist today. Contemporary discrimination is often rooted not so much in explicit legal restrictions as in the persistence of cultural models that have become entrenched over a long historical period (Scott, 1986).

The social construction of motherhood as a woman's natural destiny is one of the most evident examples of this continuity. In Roman society, as evidenced by the sources examined, motherhood was considered an essential function for the preservation of the family and the political community; similarly, in contemporary societies, even within a context of formal legal equality, women continue to face social pressures that lead them to conform to an ideal of intensive, all-encompassing, and morally obligatory motherhood. The choice not to have children or not to fully adhere to traditional models is frequently still perceived as a deviation from collective expectations, leading to social and professional stigmatization (Badinter, 2010).

The persistence of stereotypes regarding women's competencies in caregiving, nurturing, and managing the domestic sphere is also reflected in the unequal distribution of family responsibilities and in the existence of barriers that concretely impact women's professional opportunities. Numerous studies have highlighted how the so-called "motherhood penalty" remains one of the main causes of economic and employment disparities between men and women. This phenomenon demonstrates that the historical roots of gender discrimination cannot be understood solely through the analysis of legal norms but require a broader reflection on the cultural structures that have helped define, over the centuries, societal expectations of women (Correll, Benard, & Paik, 2007).

From this perspective, the study of Roman law takes on a role that transcends purely historical interest. Indeed, it allows us to identify the cultural roots of certain mechanisms of subordination which, although their outward manifestations have changed, continue to influence contemporary social dynamics. Understanding the historical roots of gender discrimination therefore means acquiring interpretive tools that are useful not only for reconstructing the past but also for critically examining the persistent inequalities of the present and the conditions necessary for achieving effective, substantive equality between men and women (Butler, 2004).

Conclusions

The gender discrimination that still characterizes contemporary societies cannot be fully understood without an analysis of its historical and cultural roots. Roman law, while representing one of the highest expressions of ancient legal rationality, contributed to the construction of a highly standardized model of womanhood, based on women's subordination to male authority

and their primary identification with reproductive and domestic roles. This model, developed within the context of the mores maiorum, was consolidated through legal institutions and social practices that defined women's status primarily in relation to their father, husband, and the political community.

An analysis of ancient sources shows that motherhood was interpreted not only as a private experience but also as a civic duty and a means of preserving the community. The ideal of the materfamilias, far from constituting merely a form of social recognition, entailed adherence to a system of expectations devised and controlled by the male-dominated world. The virtuous woman was expected to be chaste, obedient, silent, fertile, and completely devoted to caring for her family, while any deviation from this paradigm was perceived as a threat to the social order.

The persistence of these representations is particularly evident in the analysis of practices related to motherhood and breastfeeding. The reflections attributed to Favorino, taken up centuries later by Girolamo Mercurio, attest to the extraordinary historical continuity of a normative discourse that identifies motherhood with an all-encompassing biological function and considers a woman who does not fully adhere to this model to be incomplete or imperfect. The longevity of these conceptions demonstrates how cultural constructions of gender difference have spanned eras, religious systems, and social transformations while maintaining a surprising capacity for adaptation.

The story of Marzia and the debate surrounding her transfer by Cato also highlight the tension between women's consent, social expectations, and patriarchal power structures. Regardless of the various interpretations offered by modern scholarship, the account provided by the sources paints a picture of a woman whose social identity continues to be defined by her ability to bear children and by decisions made primarily within a sphere of male authority. Her acceptance of the assigned role cannot therefore be automatically interpreted as an expression of a fully free choice, but must be evaluated within the framework of the cultural and legal constraints characteristic of Roman society.

Historical reflection also allows us to see how many contemporary stereotypes regarding motherhood, the work-life balance, and the social evaluation of women's reproductive choices exhibit elements of continuity with models developed in antiquity. The idea that a woman fully realizes her identity only through motherhood, or that her social value depends on her ability to conform to specific family expectations, constitutes a cultural legacy that continues to influence public debate and current social dynamics.

From this perspective, the study of Roman law is not merely of antiquarian value but serves as an essential tool for understanding the historical processes through which categories of gender difference were constructed and long-standing discriminatory practices were entrenched. An examination of legal, literary, and historiographical sources allows us to identify the cultural mechanisms that have contributed to the normalization of inequalities and offers useful insights for a critical reflection on the persistent asymmetries that characterize contemporary societies.

Reconstructing the historical roots of gender discrimination does not, therefore, imply an anachronistic reading of the past, but rather highlights how certain social models have been progressively transmitted, reinterpreted, and adapted over the centuries. Understanding this continuity is an indispensable prerequisite for promoting genuine, substantive equality between men and women and for overcoming cultural representations that, despite their ancient origins, continue to this day to shape women's opportunities, expectations, and life trajectories.

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The New Belgian Civil Code: Modernity and the Romanist Tradition.

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Introduction

Codification is one of the most significant legal phenomena in the construction of modern states and the shaping of contemporary private law systems. From the late 18th century through the 19th century, codification efforts in continental Europe promoted the unification of laws, the rationalization of the legal system, and the strengthening of legal certainty. Among these efforts, the enactment of the French Civil Code of 1804 represented a fundamental milestone, not only because of the systematization of French private law but also because of the profound influence it exerted on numerous European and Latin American legal systems.

The Belgian experience is particularly interesting in this context. Although Belgium formally gained its independence in 1830, it continued to apply, for more than two centuries, a civil code whose structure and fundamental principles stemmed directly from the Napoleonic tradition. This legal continuity makes the Belgian case a unique example of the permanence and adaptation of a historical codification to the demands of a contemporary society.

The recent decision to undertake a comprehensive recodification of Belgian civil law is, therefore, a phenomenon of particular significance for legal scholarship. More than a simple legislative update, this process raises fundamental questions about the relationship between tradition and innovation, the role that comparative law plays in legislative drafting, and the continued relevance of historical legal categories within current legal systems.

Contemporary legal literature has noted that recodification processes offer a unique opportunity to examine the evolution of legal institutions and the ability of private law systems to adapt to social, economic, and technological changes (Zimmermann, 2009; Smits, 2002). In this regard, the Belgian case offers a particularly valuable context for analyzing the interaction between national legal tradition, foreign influences, and legislative modernization.

The research question guiding this chapter can be formulated as follows: How does the current process of recodification of Belgian civil law reflect the historical evolution of the continental European legal tradition, and what role do comparative law and Roman law play in the construction of the new Civil Code?

To answer this question, the chapter first examines the historical evolution of civil codification in Belgium, from the reception of the Napoleonic Code to the reform efforts undertaken during the 19th and 20th centuries. It then analyzes the methodology adopted for drafting the new Belgian Civil Code and the current status of its implementation. Finally, it examines the influence exerted by both comparative law ( ) and the Roman law tradition on the shaping of the new codified provisions, highlighting the challenges and opportunities this process presents for contemporary private law.

A History of Codification from a Belgian Perspective

1804: The Adoption of the Napoleonic Code

Although Belgium has formally existed as an independent state since 1830, the history of its civil law is considerably older and is closely linked to the French Civil Code of 1804, commonly known as the Napoleonic Code. Understanding this particular aspect requires a brief examination of the political and legal context of the territories that would later form the Belgian state.

During the 18th century, most of these territories were under the authority of the Austrian Habsburgs and were known as the Austrian Netherlands. However, this designation did not reflect a genuine political or legal unity. Interposed among the various territories was the Principality of Liège, an autonomous political entity that coexisted with the Austrian domains and formed part of the complex institutional mosaic characteristic of the European Ancien Régime.

Legal fragmentation was even more pronounced than political fragmentation. According to studies by Philippe Godding, more than six hundred distinct regional and local legal systems coexisted, a circumstance that highlights the extraordinary diversity of legal norms in the Belgian territories prior to modern codification. This legal plurality rested fundamentally on common law, placing the Belgian territories within the tradition of the common-law countries that characterized northern France, in contrast to the civil-law countries predominant in the southern regions of Europe.

The influence of Roman law varied considerably from region to region. Nevertheless, the ius commune generally played a subsidiary role with respect to local customs, serving as an interpretive framework intended to complement the solutions provided by particular legal systems. This coexistence of custom and Roman law reflects one of the fundamental characteristics of European legal culture prior to codification.

The situation changed radically with France's annexation of Belgian territories in 1795. This phenomenon was not an isolated case but rather part of a broader process of legal nationalization characteristic of European codifications in the 18th and 19th centuries, through which states sought to replace the plurality of local legal systems with uniform and centralized regulatory systems (Masferrer, 2016).

This incorporation brought about a profound transformation from both a territorial and a legal standpoint. The old historical borders were replaced by an administrative organization based on departments, while the revolutionary principle of a "clean slate" led to the abolition of the old local legal systems.

The replacement of traditional legal systems with French law constituted a true legal revolution. Existing legal systems were repealed and gradually replaced by French legislation, a process that culminated with the entry into force of the French Civil Code in 1804. Consequently, this code came to apply to Belgian territories as well, whose inhabitants held the status of French citizens at that time.

The adoption of the Napoleonic Code not only transformed the content of applicable law but also profoundly altered the legal culture. The administration of justice was reorganized in accordance with French principles, and legal education underwent significant reforms. Particularly significant was the closure of the former University of Leuven and the creation of new educational institutions modeled after the French system. The teaching of Roman law was

gradually replaced by courses focused on the study of positive law, reflecting the rationalist and codifying spirit characteristic of the era.

The influence of the Napoleonic Code during this period proved decisive for the subsequent evolution of Belgian law. Beyond its formal validity, it helped consolidate a new conception of law based on the centrality of written law, legislative unity, and the systematization of legal norms. These principles would continue to exert a decisive influence even after Belgium's independence.

Various authors have emphasized that the extraordinary longevity of the Napoleonic model cannot be explained solely by the technical quality of its provisions. Its success also lies in its ability to become a structural element of continental European legal culture, providing a common language for legal doctrine, case law, and university education (Halpérin, 2014; Zimmermann, 2009). The Belgian case constitutes a particularly significant demonstration of this enduring influence.

1815: The United Kingdom of the Netherlands and the First Recodification Projects

The fall of the Napoleonic Empire and the Congress of Vienna in 1815 led to a profound reorganization of the European political landscape. In this new context, the Belgian territories were incorporated into the newly formed United Kingdom of the Netherlands under the authority of William I of Orange. The new political entity brought together the former Southern and Northern Netherlands with the aim of creating a state strong enough to serve as a barrier against future French expansion. From a legal standpoint, this union posed significant challenges. Both the northern and southern territories had been influenced by French rule and applied the Napoleonic Code.

However, the reception of this text had not been uniform. While in the territories that would later form Belgium, the French codification had been widely accepted and progressively integrated into legal practice, in the Northern Netherlands there was greater resistance to the French legal legacy and a strong desire to recover elements specific to the Dutch tradition. This legal tradition was deeply influenced by what is known as Roman-Dutch law, whose main contribution was to adapt the categories of Roman law to the needs of modern legal practice (Hamza, 2017).

It was in this context that the initiative arose to draft a new civil code intended to replace the Napoleonic Code. As early as 1813, the jurist Joan Melchior Kemper had begun drafting a proposal that sought to more faithfully reflect the Dutch legal tradition. However, the integration of the southern territories into the United Kingdom of the Netherlands substantially altered the political conditions of that process.

Belgian representatives quickly expressed their opposition to the unilateral adoption of a code drafted exclusively from a Dutch perspective. As a result, it was agreed to draft a new bill with the participation of jurists from both the north and the south. This decision gave rise to a major exercise in legal cooperation aimed at harmonizing partially divergent legal traditions within a single state.

The leadership of this work was entrusted to Judge Pierre-Thomas Nicolaï, who coordinated the drafting of a joint bill intended to become the future civil code of the United Kingdom of the Netherlands. Although the text was scheduled to take effect on February 1, 1831, the political events leading to Belgian independence prevented its implementation in the southern territories.

Nevertheless, the draft was not completely abandoned. Following Belgian secession, it was adopted in the Northern Netherlands in 1838 under the name Burgerlijk Wetboek, becoming one of the fundamental pillars of modern Dutch private law. This circumstance constitutes an interesting historical paradox: a draft conceived for a united state ended up being applied only in one of the two entities that had initially participated in its drafting.

1830: Political Independence and Legal Continuity

Belgium's independence, proclaimed in 1830, marked the beginning of a new political and institutional era. The Belgian Constitution of 1831, considered one of the most progressive of its time, laid the foundations for the new liberal state and recognized the need to adapt legal structures to the new national reality.

In this regard, Article 139 of the Constitution expressly provided for the revision of the existing codes as soon as possible. This provision reflected a logical aspiration of any newly formed state: to establish its own legal system that would reinforce its political and institutional identity.

The decision to undertake a recodification stemmed from multiple factors. On the one hand, there was a clear desire to assert national sovereignty through the creation of specifically Belgian institutions. On the other hand, the work carried out during the period of the United Kingdom of the Netherlands had generated a momentum for reform that seemed to favor the drafting of new legislative texts.

However, the initial enthusiasm gradually waned. Over time, many Belgian jurists began to perceive the Napoleonic Code not as a foreign imposition, but as an integral part of their own legal tradition. This perception was fostered by several circumstances. First, the code's prolonged validity had allowed for the development of a national legal doctrine closely linked to its provisions. Second, retaining the text ensured access to a wealth of French legal scholarship and case law a resource of immense value for the interpretation and application of the law.

As a result, the comprehensive revision provided for by the Constitution never materialized. The reforms adopted during the 19th century were limited to specific aspects of civil law. Among these, the Mortgage Act of 1851 stands out, as it introduced significant changes regarding real estate publicity and security interests. However, these interventions did not substantially alter the general structure inherited from the Napoleonic Code.

The Belgian experience thus highlights a common reality in the history of codification: the longevity of a code does not depend exclusively on its political origin but also on its ability to generate stability, legal certainty, and doctrinal consensus within a given legal community.

François Laurent and the Great Reform Project of the 19th Century

One of the most ambitious attempts to transform Belgian civil law was associated with François Laurent, considered one of the most influential figures in 19th-century Belgian legal scholarship.

A professor at the University of Ghent and author of the monumental work *Principes de droit civil*, published in thirty-three volumes between 1869 and 1879, Laurent enjoyed extraordinary academic and intellectual prestige. His doctrinal authority led the liberal government to entrust him with drafting a preliminary Civil Code intended to replace the Napoleonic text still in force.

The decision to entrust this task to a single individual was exceptional within the Belgian legislative tradition, which was typically characterized by the work of collective commissions.

Between 1879 and 1884, Laurent developed a draft that clearly reflected his philosophical, legal, and political convictions.

From a contemporary perspective, many of his proposals can be considered ahead of their time. Particularly innovative were the reforms concerning gender equality, the rules of filiation, and divorce. Furthermore, the draft incorporated a distinctly liberal view of the relationship between the state and religious institutions a particularly sensitive issue in the Belgian political context of the time.

It was precisely these characteristics that sparked intense opposition from Catholic circles. The political shift that followed the 1884 elections radically altered the prospects for reform. The victory of the Catholic Party signaled the definitive abandonment of Laurent's draft and the beginning of a new phase characterized by a much more conservative stance toward codification.

Although it never became law, Laurent's preliminary draft retains enormous historical significance. Not only does it constitute one of the most comprehensive exercises in reflection on the modernization of Belgian civil law, but it also anticipated debates that would resurface with force during the reform processes undertaken more than a century later.

From Legislative Stagnation to Contemporary Recodification: The Koen Geens Era

Following the failure of the major reform projects of the 19th century, Belgium experienced a prolonged period of regulatory stability. For much of the 20th century, civil law reforms were carried out through ad hoc amendments, without challenging the general structure inherited from the Napoleonic Code.

Legal scholarship gradually identified the limitations of this model. The accumulation of special laws, the growing complexity of legal relationships, and the emergence of new economic and social realities generated increasing tensions within a codification system designed for a profoundly different society.

At the beginning of the 21st century, the idea that a comprehensive reform was inevitable began to take hold. This debate culminated during Koen Geens's tenure as Minister of Justice between 2014 and 2020. Under his leadership, the most ambitious recodification process undertaken in Belgium since the 19th century was initiated.

Unlike previous attempts, the goal was no longer to completely replace the existing legal tradition. The primary aim was to modernize civil law, update its terminology, systematize the evolution of case law, and adapt classical institutions to contemporary needs. This pragmatic approach largely explains the broad political and academic consensus that accompanied the reform.

The process initiated in 2014 thus represents a new phase in the history of Belgian codification. Rather than a break with the past, it constitutes an effort to reconcile continuity and renewal, preserving the fundamental elements of the Belgian legal tradition while incorporating solutions capable of addressing the challenges of the 21st century.

The New Belgian Civil Code: Methodology, Structure, and Progress

The recodification of Belgian civil law is one of the most significant legislative processes undertaken in continental Europe during the first decades of the 21st century. Far from seeking

a radical break with the existing legal tradition, this reform has been primarily aimed at updating, systematizing, and modernizing legal institutions whose normative basis still dated back to the Napoleonic Code of 1804.

Contemporary legal scholarship has noted that modern recodification processes differ significantly from the major codifications of the nineteenth century. While the latter responded to the need to unify fragmented legal systems and consolidate the construction of nation-states, current recodifications primarily seek to improve regulatory coherence, adapt the law to new social and economic realities, and incorporate developments arising from case law and legal scholarship over decades or even centuries of legislative application (Hage, 2011; Zimmermann, 2009).

The Belgian case fits squarely within this trend. The legislature's objective was not to completely replace the existing civil law, but rather to reorganize and update it through a more rational structure adapted to contemporary demands. This approach explains both the methodology adopted for drafting the new Code and the specific characteristics of the various books that comprise it.

The Creation of the Working Groups

The recodification process was launched as a direct result of the government agreement of October 10, 2014. In accordance with that agreement, Minister of Justice Koen Geens spearheaded the creation of various specialized commissions tasked with drafting the provisions corresponding to the different books of the future Civil Code.

The methodological approach adopted deserves special attention. Unlike the major codification projects of the 19th century which were generally characterized by a single commission responsible for the entire text the Belgian legislature opted for a decentralized model based on specialized working groups. Each commission was responsible for a specific subject area and consisted primarily of university professors and recognized specialists in the relevant field.

The experts were initially appointed by ministerial letters dated June 18, 2015, which allowed work to begin immediately. Subsequently, the commissions were formally established by the Ministerial Order of September 30, , 2017. This sequence highlights the importance attached to the technical expertise of the experts, whose participation constituted one of the fundamental pillars of the reform process.

The predominantly academic composition of the commissions reflects a recurring feature of major reforms of European private law. As various authors have noted, legal scholarship traditionally plays a particularly significant role in continental legal systems, where legal doctrine not only interprets the rules but also frequently plays an active role in their drafting and systematization (Van Hoecke, 2004).

However, this high degree of specialization also posed risks. Each working group focused its efforts on a specific area of civil law, which could lead to problems of systematic coherence among the various books of the future code. To minimize this risk, the Council of State was assigned a coordinating role aimed at ensuring the harmonization of the various legislative proposals.

Another notable aspect of the methodology adopted was the use of public consultation mechanisms. The various commissions periodically submitted their drafts for consideration by the legal community and interested professional sectors. These consultations made it possible

to gather comments from judges, attorneys, notaries, academics, and organizations representing various social and economic sectors.

The participation of these stakeholders contributed significantly to enriching the legislative texts and bolstered the legitimacy of the reform process. From a contemporary perspective, this participatory model reflects a significant evolution from classical codifications, which were traditionally conceived as projects drafted exclusively by experts and subsequently imposed by the legislature.

The Structure of the New Belgian Civil Code

One of the most innovative aspects of the Belgian recodification lies in the systematic reorganization of civil law. The structure inherited from the Napoleonic Code had been the subject of doctrinal criticism for decades due to the difficulties it posed in reflecting the growing complexity of contemporary private law.

Originally, the recodification project envisaged a structure consisting of nine books:

- Book 1: General Provisions.
- Book 2: Persons, the Family, and the Property Relations of Couples.
- Book 3: Property.
- Book 4: Successions, Gifts, and Wills.
- Book 5: Obligations.
- Book 6: Special Contracts.
- Book 7: Security Interests.
- Book 8: Evidence.
- Book 9: Statute of Limitations.

However, during the drafting of the legislative texts, it was deemed appropriate to separate tort liability from the general regime of obligations. As a consequence of this decision, a specific book dedicated to this subject was created, bringing the total number of books in the new Civil Code to ten.

The final structure was organized as follows:

- Book 1: General Provisions.
- Book 2: Individuals, the Family, and Property Relationships Between Couples.
- Book 3: Property.
- Book 4: Inheritance, Gifts, and Wills.
- Book 5: Obligations.
- Book 6: Non-Contractual Civil Liability.
- Book 7: Special Contracts.
- Book 8: Evidence.
- Book 9: Guarantees.
- Book 10: Statutes of Limitations.

This reorganization represents a significant departure from the traditional structure inherited from the Napoleonic model. While the French Civil Code still followed the tripartite scheme inspired by Gaius's *Institutes* persons, property, and modes of acquiring property the new Belgian Civil Code adopts a much more analytical and specialized system.

Comparative legal scholarship has noted that this evolution reflects a general trend observed in numerous contemporary legal systems. The gradual abandonment of structures inherited from the classical Roman tradition reflects the need to adapt the organizational framework of the law to a modern conception of private law centered on subjective rights and substantive legal relationships rather than on the procedural actions that characterized Roman legal thought (Smits, 2002).

Particularly evident is the influence exerted by more recent codification efforts, especially the civil codes of the Netherlands and Quebec. Both texts had already opted for a more detailed and systematic structure, incorporating separate books devoted to subjects such as evidence or statutes of limitations. The Belgian recodification clearly falls within this trend toward modernizing codification techniques.

Book 1 and the Question of the Sources of Law

Within the new legal framework, Book 1 occupies a unique position. Its title "General Provisions" might suggest the existence of a genuine general part comparable to the Allgemeiner Teil of the German Civil Code (BGB). However, this impression is misleading. In reality, Book 1 contains only twelve articles and is much closer to a preliminary title than to a true general part inspired by the pandectist tradition. Its main function is to establish certain fundamental principles applicable to private law as a whole.

Among its provisions, Article 1.1, concerning the sources of civil law, stands out in particular. This provision recognizes the coexistence of the Civil Code with other laws, custom, and the general principles of law, while limiting the normative value of customs to cases expressly provided for by law or by contract.

The inclusion of a provision of this nature is particularly significant because it reflects a pluralistic conception of legal sources. Unlike the strictly legalistic view characteristic of nineteenth-century codifications, the new Civil Code explicitly recognizes the importance of other normative sources in the development of contemporary private law.

Likewise, certain concepts traditionally developed by case law and legal doctrine receive express legislative recognition for the first time. Such is the case with the prohibition against the abuse of rights and the principle of *fraus omnia corrumpit* institutions that for decades had played a significant role in legal practice without being formally codified.

This development highlights one of the fundamental objectives of the Belgian recodification: to incorporate into the legislative text solutions that have been widely established by legal practice, thereby strengthening legal certainty and the accessibility of private law.

The Role of Comparative Law in the New Belgian Codification

One of the most interesting aspects of the contemporary process of recodification of Belgian civil law is the role that comparative law plays in the drafting of the new provisions. The use of foreign models in legislative reform processes is not a new practice. On the contrary, the history

of European codifications shows that the circulation of legal ideas, institutions, and concepts has been a constant since the 19th century.

In this context, comparative legal research takes on particular significance as a tool for understanding processes of legal transformation and the evolution of contemporary legal systems. Academic research plays a fundamental role in this area by creating spaces for critical analysis that allow legislative changes to be interpreted from historical, comparative, and interdisciplinary perspectives. As Barros and Bores (2024) point out, social science research is an essential mechanism for generating knowledge applicable to contemporary problems, while Cárdenas-Palomino et al. (2024) highlight the importance of strengthening academic training and scientific reflection as indispensable elements for developing new responses to the current challenges facing institutions and legal systems.

In general terms, contemporary comparative legal doctrine recognizes that comparative law fulfills various functions within the processes of lawmaking. In some cases, it serves as a tool for identifying legal solutions that have already been successfully implemented in other legal systems. In others, it allows for verifying the coherence of certain institutions or assessing the practical consequences of potential reforms. Furthermore, comparative analysis facilitates the progressive harmonization of legal systems and contributes to the construction of a shared legal culture, especially within the European context (Smits, 2002; Gordley, 1995).

From this perspective, one might expect that a project as ambitious as the Belgian recodification would have conducted an exhaustive comparative study of the major contemporary civil codes. However, an examination of the preparatory works allows for a more nuanced conclusion.

Indeed, both the legislature's statements and the explanatory memoranda for the various drafts reveal an express intention to draw upon comparative law. However, upon detailed analysis of the adopted texts and the references actually used during their drafting, the foreign influence appears considerably more limited than one might initially assume.

This observation is particularly evident in relation to Article 1.1 of the Civil Code, concerning the sources of law. As E. Dirix and P. Wéry explain in the preparatory works, the drafting of this provision was inspired by various foreign civil codes, among which the Austrian Civil Code of 1812, the Spanish Civil Code of 1889, and the Estonian Civil Code of 2002 are expressly mentioned.

However, a closer analysis reveals that the similarities are uneven. The reference to the Austrian Allgemeines Bürgerliches Gesetzbuch (ABGB) is relatively weak. Sections 10 through 13 of the Austrian code address issues related to customs, the territorial validity of certain rules, the value of judicial precedents, and legal privileges, but do not contain a formulation equivalent to that adopted by the Belgian legislature.

By contrast, the similarity to Article 1 of the Spanish Civil Code is much more evident. The latter establishes that the sources of the Spanish legal system are law, custom, and the general principles of law. Similarly, the Estonian Civil Code expressly recognizes law and custom as sources of civil law. In both cases, a conceptual structure very close to that ultimately adopted by the new Belgian Civil Code can be observed.

To these expressly acknowledged influences, one could add a comparison with other European legal systems. The case of the Swiss Civil Code of 1907 is particularly illustrative; its first article provides that the law governs all matters falling within the letter or spirit of its provisions and that, in the absence of an applicable rule, the judge must decide in accordance with customary

law and, failing that, according to the rule the judge would establish if acting as a legislator, drawing further on legal doctrine and case law.

A comparison of these texts reveals a fundamental difference. While the Spanish, Estonian, and Swiss codes seek to explicitly define the role of the various sources of law and to guide the judge's interpretive activity, Article 1.1 of the Belgian Civil Code adopts a much more cautious approach. Far from establishing a clear hierarchy among the sources or specifying the role of case law, it merely acknowledges the coexistence of various sources of law without precisely defining their reciprocal relationships.

This caution is particularly evident in the article's opening phrase, which begins with the words "without prejudice to special laws, custom, and the general principles of law." From a symbolic perspective, this choice of terminology may seem surprising. Traditionally, codification processes have been characterized by a strong assertion of the code's authority as a systematic and comprehensive expression of private law. In contrast, the phrasing adopted by the Belgian legislature seems to immediately highlight the limits of codification itself.

When compared with the Spanish, Italian, or Swiss civil codes, it is evident that none of them begins the regulation of sources with an expression equivalent to "without prejudice to." This difference reflects a distinct conception of the code's role within the contemporary legal system. While the major nineteenth-century codifications aspired to constitute truly comprehensive and self-sufficient systems, current recodifications seem to assume with greater realism the coexistence of multiple sources of law and the impossibility of legislatively anticipating all possible legal situations.

Consequently, an analysis of this example allows us to make a more general observation about the Belgian recodification process. Although the use of comparative law was expressly advocated by its proponents, the actual influence of foreign models appears to have been relatively limited. Rather than importing innovative legal solutions from other legal systems, the drafters of the new Civil Code focused primarily on reorganizing, updating, and systematizing institutions already present in Belgian law.

This is consistent with the overall purpose of the reform. As noted earlier, the primary aim was not to create an entirely new code, but rather to adapt existing law to the doctrinal and jurisprudential developments that had taken place over more than two centuries of application of the Napoleonic Code. From this perspective, comparative law played a complementary and guiding role, but it was not the main driving force behind the recodification.

In short, it can be said that the new Belgian Civil Code represents more of an internal modernization of national private law than an intensive adoption of foreign models. Legal comparison was present during the legislative drafting process, but its specific influence was much more moderate than is typically observed in other contemporary recodification efforts.

Roman Law in the New Codification

Beyond methodological and comparative issues, one of the most interesting aspects of the new Belgian Civil Code lies in the persistence of the Roman law tradition within its provisions. Although the recodification was conceived as an exercise in legislative modernization aimed at adapting private law to contemporary needs, an analysis of some of its articles demonstrates that numerous fundamental categories of civil law continue to rest on conceptual constructs developed by Roman jurists nearly two thousand years ago.

The persistence of these legal institutions is not a phenomenon unique to Belgium. Numerous authors have emphasized that Roman law continues to exert a decisive influence on continental European legal systems, particularly in areas such as the law of obligations, property rights, inheritance, and the general theory of legal acts (Zimmermann, 1996; Johnston, 1999). This historical continuity explains why many contemporary legislative reforms even those intended to be innovative ultimately reproduce legal categories whose origins can be traced back to Roman sources.

To illustrate this reality, it is particularly significant to examine Articles 5.1 through 5.3 of the new Belgian Civil Code, which were incorporated through the reform of Book 5 on obligations. These are provisions that had no direct equivalent in the Napoleonic Code of 1804, but which, far from being original creations of the contemporary legislature, reproduce legal concepts deeply rooted in the Romanistic tradition.

The Definition of Obligation and the Justinian Legacy

Article 5.1 of the new Belgian Civil Code provides:

"An obligation is a legal bond by virtue of which a creditor may require a debtor, if necessary through the courts, to perform a specific act."

The wording used bears a striking resemblance to the famous definition contained in Justinian's Institutes:

Obligatio est iuris vinculum, quo necessitate adstringimur alicuius solvendae rei secundum nostrae civitatis iura (Inst. 3.13 pr.).

The persistence of the notion of *obligatio* as *iuris vinculum* constitutes one of the most significant examples of historical continuity between classical Roman law and modern European civil law systems (Frýdek, 2011). The conceptual proximity between the two texts is evident.

In both cases, an obligation is conceived as a legal bond that unites two parties and enables the enforcement of a specific performance. This is not merely a terminological coincidence. The very conceptual structure of the definition faithfully reproduces the framework developed by classical Roman jurisprudence and subsequently systematized during the Justinian compilation.

The persistence of this notion confirms the extraordinary resilience of certain legal categories. Despite the profound social, economic, and political transformations Europe has undergone since antiquity, the fundamental idea of the obligation as a legal bond continues to constitute the conceptual core of modern law of obligations.

Contemporary legal scholarship has pointed out that one of the reasons for this persistence lies in the extraordinary level of abstraction achieved by Roman jurists. By formulating sufficiently general concepts, they succeeded in creating categories capable of adapting to very different historical contexts without losing their practical utility (Stein, 1999). The obligation is probably one of the clearest examples of this capacity for conceptual abstraction.

From a methodological perspective, contemporary recodification processes often rely on the transnational circulation of legal models, a phenomenon that comparative legal scholarship has identified as one of the main drivers of the evolution of modern civil law systems (Mańko, 2024).

Natural Obligations and the Continuity of Classical Categories

The Roman influence is also evident in Article 5.2 of the new Civil Code, which is devoted to the natural obligation. This provision establishes that a natural obligation is one whose performance cannot be judicially enforced, but whose voluntary fulfillment produces valid legal effects and cannot be subject to restitution when it has been performed without error or coercion.

Although the modern text employs terminology characteristic of contemporary law, the institution refers directly to a category extensively developed by Roman jurisprudence and subsequently reworked by European civil law doctrine. Natural obligations made it possible to recognize certain moral or social duties which, even in the absence of a r legal action to enforce their fulfillment, produced certain legal effects when performed voluntarily.

The express incorporation of this concept into the new Belgian Civil Code demonstrates the legislature's intent to preserve traditional institutions that have proven their practical utility over the centuries. It also highlights that legislative modernization does not necessarily entail a break with the past, but may instead consist of adapting historical categories to new social realities.

The Sources of Obligations and the Influence of Gaius

The influence of Roman law is equally evident in Article 5.3, concerning the sources of obligations. According to this provision:

"Obligations arise from a legal act, a quasi-contract, tort, or the law."

This enumeration inevitably recalls the classification developed by Gaius and preserved in Justinian's Digest:

Obligationes aut ex contractu nascuntur aut ex maleficio aut proprio quodam iure ex variis causarum figuris (D. 44.7.1).

At first glance, significant differences between the two formulations might be apparent. While Gaius distinguished between contracts, torts, and various causal figures, the Belgian legislature refers to legal acts, quasi-contracts, tort liability, and the law.

However, a more in-depth analysis reveals that these differences stem primarily from the systematic evolution of legal scholarship from Roman times to the present. In essence, modern categories constitute developments and refinements of the original Roman classifications. Nevertheless, contemporary legal scholarship has emphasized that modern categories continue to reflect the conceptual structure developed by Roman jurists to explain the origin of pecuniary obligations (Polo Arévalo, 2024).

Modern tort liability finds its historical precedent in obligations arising ex delicto, particularly those derived from the application of the lex Aquilia. Similarly, quasi-contracts continue to encompass legal institutions already known to Roman jurists, such as agency without authority, unjust enrichment, and payment in error.

Consequently, the contemporary classification does not represent a break with the Roman framework, but rather a conceptual reorganization intended to provide greater systematic precision.

The Paradox of the Invisible Tradition

Perhaps the most striking aspect of this Romanistic influence is not its existence, but the fact that it appears to have occurred unconsciously.

Indeed, the preparatory work for Book 5 contains no explicit references to Justinian's Institutes or the Digest as direct sources of inspiration. According to the explanatory memorandum, the definitions incorporated into the new Code were considered simply as traditional formulations widely accepted by contemporary civil law doctrine.

This circumstance presents an interesting intellectual paradox. On the one hand, it could be interpreted as a sign of the gradual decline of Roman law studies within modern legal education. On the other hand, it is precisely evidence of the extraordinary vitality of Roman law. Its concepts have become so deeply ingrained in European legal culture that they continue to be used even when those who use them are no longer fully aware of their historical origin.

In this sense, the situation recalls Goethe's famous observation that Roman law resembles a duck that periodically disappears beneath the water only to reappear shortly thereafter with full vitality. The metaphor aptly illustrates the adaptability and resilience of a legal tradition that, far from disappearing, continues to manifest itself in new forms.

Conclusions

The recodification process undertaken by Belgium constitutes one of the most significant phenomena in contemporary European private law. However, an analysis of the work carried out to date leads to the conclusion that this is not a radical break with the preceding legal tradition, but rather an exercise in progressive modernization aimed at adapting the old Napoleonic Code to the doctrinal, jurisprudential, and social transformations that have taken place over more than two centuries of its application.

In this regard, the innovations introduced by the new Belgian Civil Code are relatively limited when compared to the major codifications that have shaped European legal history. The primary purpose of the working groups was not to construct an entirely new legal system, but rather to reorganize, update, and clarify institutions already firmly established within the Belgian legal system. It can therefore be stated that the Belgian recodification follows a logic of continuity rather than rupture, prioritizing legal certainty and the stability of the system over profound structural transformations.

This approach is particularly evident in the methodology adopted for drafting the various books of the Code. The decision to entrust the drafting of each subject matter to specialized commissions made it possible to bring together highly qualified experts in every sector of civil law. However, this very specialization posed certain challenges in terms of systematic coherence, forcing the legislature and the Council of State to assume a coordinating role aimed at preserving the conceptual unity of the new Code. As a result, the final product exhibits noticeable differences between the various books, reflecting to some extent the diversity of approaches and perspectives among the groups responsible for drafting them.

From a methodological perspective, it can also be observed that the Belgian recodification is part of a broader trend characterizing European legislative reforms in recent decades. Various authors have pointed out that contemporary codifications no longer pursue the nineteenth-century ideal of exhaustiveness and normative self-sufficiency, but rather seek to establish flexible legal frameworks capable of coexisting with a plurality of sources and with the constant

evolution of case law and legal doctrine (Smits, 2002; Hage and Akkermans, 2014). The new Belgian Civil Code appears to respond precisely to this logic of open and evolving codification.

As for the use of comparative law, the analysis conducted allows for an equally nuanced assessment. Although the explanatory memoranda and preparatory works make explicit reference to various foreign legal systems, the actual influence of these models appears to have been more limited than one might initially assume. The examples examined show that the Belgian legislature used comparative law primarily as a tool for consultation and guidance, rather than as a true source of legal adoption.

This observation does not imply a total absence of foreign influence. On the contrary, the very structure of the new Code reveals the presence of contemporary European models, particularly in the systematic organization of certain subjects and in the creation of separate books devoted to evidence, remedies, and statutes of limitations. However, these influences remain subordinate to the primary objective of adapting Belgian law to its own internal evolution, which explains why many of the solutions ultimately adopted retain a distinct national identity.

Perhaps the most interesting aspect of the new codification, however, is the persistence of the Roman law tradition. Although the drafters of the Code did not explicitly set out to revive institutions of Roman law, numerous provisions incorporated during the reform reveal a notable continuity with legal categories developed by classical jurisprudence and subsequently systematized by the Justinian Code. Examples relating to the definition of an obligation, natural obligations, and the sources of obligations clearly illustrate this reality. Far from being mere historical vestiges, these categories continue to provide effective conceptual tools for understanding and regulating contemporary legal relationships. The persistence of such notions confirms the extraordinary adaptability of Roman law and its role as one of the intellectual foundations of the continental European legal tradition.

It is particularly significant that this influence manifests itself even when the drafters themselves do not seem to be fully aware of it. This circumstance demonstrates that Roman law has ceased to be merely an object of historical study and has become a structural component of European legal culture. Its concepts, categories, and lines of reasoning remain embedded in the everyday language of jurists and continue to shape the development of contemporary private law. From a broader perspective, the Belgian experience highlights the complex relationship between tradition and innovation within codification processes. Legislative modernization does not necessarily entail the replacement of inherited legal categories; rather, it can take place through the reinterpretation and adaptation of historical institutions capable of responding to new social needs. In this sense, the Belgian recodification serves as a particularly illustrative example of how the evolution of private law can occur through continuity rather than through rupture.

The Belgian experience confirms that contemporary recodification processes do not necessarily entail a break with prior legal tradition. On the contrary, they often combine normative innovation with the preservation of historical concepts whose functionality has proven its validity over time, especially those stemming from the Romanistic tradition (Suárez Blázquez, 2023). In short, the new Belgian Civil Code appears to be the result of a delicate balance between preserving a two-century-old legal tradition and the need to respond to the challenges of the 21st century. Its study provides insight not only into the recent transformations of Belgian civil law but also into some of the main trends currently shaping the evolution of European codifications . It also demonstrates that comparative law and the Romanistic tradition continue to play a significant role in the development of contemporary private law, although their

influence manifests itself in ways different from those observed during the major codification movements of the 19th and 20th centuries.

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The Minimum Degree of Rationality Required of Human Beings in the Roman Legal System

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Introduction

Roman law is one of the most influential legal systems within the Western legal tradition because many of the dogmatic categories currently used by contemporary legal systems have their origins in the concepts developed by classical Roman jurisprudence. Institutions related to contracts, obligations, property, liability, and good faith continue to reflect principles formulated by Roman jurists centuries ago. However, beyond its strictly normative relevance, Roman law also developed a profound conception of human conduct and of the rational and moral parameters that should govern social and legal relations within the Roman political community (Bretone, 2003).

Roman jurisprudence was not limited solely to regulating legal acts or establishing financial consequences arising from certain behaviors; rather, it constantly evaluated human conduct based on criteria related to prudence, honesty, diligence, and integrity. Various passages from the Digest reveal that Roman jurists implicitly conceived of an ideal model of a rational person whose conduct had to conform to certain minimum standards in order to merit legal protection. In this regard, concepts such as the *bonus vir*, *boni viri arbitratu*, *culpa lata*, contractual good faith, and the prohibition of *causae torpes* reflect a constant concern with distinguishing between socially acceptable conduct and behavior considered contrary to rationality and legal morality (Schulz, 1951).

This research is based on the following research question: Can a prototype of human behavior based on a minimum degree of legal and moral rationality be identified within the Roman legal system? Based on this question, the main objective is to analyze various texts from the Digest and other Roman legal sources to demonstrate that classical jurisprudence developed criteria aimed at requiring certain standards of rationality, prudence, and moral correctness as conditions for recognizing the validity and legal protection of human conduct.

The significance of this study lies in its ability to shed light on how Roman law integrated ethical and rational elements into the construction of fundamental legal institutions. Today, many contemporary discussions regarding good faith, abuse of rights, civil liability, or standards of diligence continue to reflect categories rooted in the Roman legal tradition. Consequently, studying this historical background is not only of historical interest but also of dogmatic and philosophical interest for understanding the evolution of Western legal thought (Stein, 1999).

Furthermore, this research is significant because it highlights the close relationship between law and morality in classical Roman thought. Unlike certain modern conceptions characterized by a strict separation between legal norms and moral values, Roman jurisprudence consistently evaluated human conduct by taking into account elements related to honesty, prudence, good faith, and social propriety. This demonstrates that Roman law did not conceive of the individual solely as an abstract subject of rights and obligations, but also as a member of a community governed by certain ethical and rational ideals (Marzoa, 1981).

Methodologically, this chapter is structured around a dogmatic-legal approach grounded in the exegetical and interpretive analysis of various passages from the Digest related to natural law,

usufruct, fraud, negligence, intimidation, and torpes causes. Additionally, contemporary doctrinal contributions from Roman law studies indexed in specialized academic databases are incorporated to contextualize and strengthen the legal analysis presented.

The incorporation of contemporary studies from indexed publications helps strengthen the legal analysis from interdisciplinary perspectives linked to the social sciences and humanities. In this regard, Barros and Bores (2024) emphasize that contemporary scientific research in the social sciences requires integrating historical, philosophical, and normative approaches to adequately understand legal phenomena and their impact within social structures. This perspective is particularly useful for the study of Roman law because it allows for the analysis of its institutions not only as historical constructs but also as theoretical models that continue to influence the modern understanding of legal rationality and human behavior.

The chapter is structured into five main sections. The first examines certain forms of human behavior considered natural within Roman legal thought. Subsequently, the chapter analyzes the concept of *boni viri arbitratu* as a legal standard of rational and prudent conduct. The third section examines the categories of *dolo*, *culpa*, and intimidation as mechanisms for the legal assessment of human behavior. It then addresses the condictio ob turpem vel iniustam causam and the exclusion of legal protection with respect to immoral acts. Finally, a general discussion is presented aimed at demonstrating that the Roman legal system implicitly constructed a prototype of a rational and morally correct human being as the foundation for multiple legal institutions.

Natural Law and Expected Human Conduct in Rome

Roman legal thought developed a complex conception of natural law as the rational and universal foundation of certain human behaviors considered inherent to human nature itself. Unlike civil law, whose existence depended on the political will of a specific community, ius naturale was understood by Roman jurists as a set of common principles derived from nature itself and applicable not only to all human beings but even to animals. This view made it possible to justify certain behaviors as natural expressions of rationality and social coexistence (Domingo, 2018).

One of the most significant texts on this subject is by the jurist Ulpian, who defined natural law as that which "nature has taught to all animals." Building on this idea, the jurist included within ius naturale behaviors related to the union between a man and a woman, procreation, and the raising of children. Although today these behaviors might be considered social or legal norms created by humans, in Roman jurisprudence they represented natural and intrinsic behaviors derived from the human condition itself. Consequently, it can be observed that the " " of Roman law was based on the existence of certain expected behaviors whose foundation lay in the rational and social nature of the individual (Biondi, 1965).

The Roman notion of natural law also incorporated principles related to equality and justice. Ulpian asserted that "with regard to natural law, all men are equal," a particularly significant statement within a society legally characterized by profound differences between citizens, foreigners, and slaves. Although this equality did not always have full practical effect, it demonstrates that Roman jurisprudence recognized the existence of a common human condition grounded in universal rational criteria.

Rationality also appears linked to the idea of justice in various Roman legal texts. Pomponius maintains that "by natural law, it is just that no one should enrich themselves to the detriment and harm of another," thus formulating one of the most important precursors to the principle

prohibiting unjust enrichment. This passage reveals that Roman law considered the accumulation of wealth obtained through the harm of others to be irrational and unjustified. In other words, Roman jurisprudence held that legally valid conduct must respect certain minimum standards of justice and social balance (Zimmermann, 1996).

Likewise, natural law justified certain defensive behaviors aimed at preserving life and personal safety. Paulus noted that "natural reason permits one to defend oneself against danger," thereby recognizing that self-defense constitutes a rational reaction inherent in human nature. This idea is particularly relevant because it demonstrates that Roman jurisprudence evaluated human conduct not only based on its material outcome but also by considering the rational circumstances that motivated the individual's actions. Self-defense thus appeared as a legally acceptable expression of the natural instinct for self-preservation (Kaser, 1982).

Various contemporary studies argue that the Roman conception of natural law made it possible to construct a normative vision of expected behavior within society. Behaviors considered natural not only described certain common human behaviors but also served as legal and moral parameters for assessing the correctness of specific social actions. Consequently, ius naturale functioned simultaneously as the rational foundation of law and as a criterion for the ethical evaluation of human conduct (Stein, 1999)

Furthermore, it is important to note that Roman law consistently linked rationality and prudence within numerous legal institutions. Human decisions had to meet certain minimum standards of diligence and foreseeability in order to receive legal protection. When a person acted impulsively, negligently, or contrary to common sense, Roman jurisprudence tended to limit or even deny certain favorable legal effects. This suggests that the Roman legal system did not conceive of the individual as a subject absolutely free to act arbitrarily, but rather as a member of a social order governed by shared rational and ethical principles (Schulz, 1951).

Consequently, an analysis of Roman natural law allows us to identify the earliest elements of the prototype of the human being implicitly constructed by classical jurisprudence. This model demanded rational, prudent, and socially appropriate behavior, while rejecting conduct considered abusive, unjust, or irrational. Building on these foundations, various subsequent legal institutions developed even more specific standards related to diligence, honesty, and good faith, progressively consolidating a legal ideal of human conduct within Roman law.

The *boni viri arbitratu* as a Legal Model of Rational Conduct

Among the many concepts developed by Roman jurisprudence, few reflect the existence of an ideal model of human conduct as clearly as the expression *boni viri arbitratu*. This legal formula appears in various passages of the Digest, primarily in connection with usufruct and certain procedural obligations, constituting a normative criterion used to assess whether a person's conduct met minimum standards of prudence, honesty, and rationality. Although Roman sources do not offer an explicit definition of what is meant by *bonus vir*, various texts allow us to reconstruct, from a doctrinal perspective, the characteristics that comprised this prototype of behavior expected by the Roman legal system (Schulz, 1951).

The concept of the *bonus vir* has deep ethical and social roots in classical Roman thought. In Roman legal culture, the "good man" was not merely one who formally complied with legal norms, but also one who acted in accordance with ideals of honesty, moderation, prudence, and moral correctness. Roman jurisprudence consistently drew upon references to the *vir bonus* to establish standards of conduct applicable to both property and procedural matters. Consequently, the boni viri arbitratu served as an objective measure of conduct based on the

idea of how a reasonable and honorable person would act under certain circumstances (Bretone, 2003).

One of the main areas where this concept appears is usufruct. The usufructuary was required to provide a cautio usufructuaria, committing, among other obligations, to exercise the right "as a good man would." This duty entailed using another's property prudently and rationally, avoiding acts of abuse, deterioration, or excessive exploitation. The usufructuary could not behave arbitrarily with respect to the property received, as case law held that the legitimate exercise of a property right required both responsibility and moderation (Kaser, 1982).

The Digest specifically mentions that the usufructuary was to cultivate an estate as a righteous and diligent man would. This criterion reveals that Roman law did not conceive of the economic exploitation of property as an absolute power detached from rational or ethical limits. The use of property had to be carried out while respecting the preservation of the property itself and avoiding conduct motivated exclusively by greed or excessive profit. From this perspective, the *bonus vir* represents an individual capable of balancing economic utility and legal responsibility in his or her property-related decisions (Zimmermann, 1996).

Prudence thus emerges as one of the key elements comprising the standard of boni viri arbitratu. Roman case law expected a rational person to be capable of foreseeing the normal consequences of their actions and to act in accordance with minimum standards of diligence and foreseeability. When the usufructuary overexploited a property, depleted resources, or engaged in economically unsustainable activities, it was considered that he was acting contrary to the behavior expected of a prudent man. Consequently, Roman legal rationality was closely linked to the capacity for moderation and foresight (Stein, 1999).

Ulpian offers particularly illustrative examples of conduct incompatible with the ideal of the *bonus vir*. The jurist points out that the usufructuary does not act as a good man when he pollutes the air of the countryside or engages in activities that seriously compromise the * * future conservation of the estate. Likewise, he criticizes those forms of land use that require excessive expenses or structures that the owner cannot subsequently sustain. These passages reveal that Roman jurisprudence rejected irrational behavior characterized by abuse, recklessness, or a lack of economic sustainability (Biondi, 1965).

It is particularly relevant to note how the concept of *boni viri arbitratu* implicitly incorporates a social conception of responsibility. An individual could not exercise their rights while completely ignoring the consequences that their actions would have on other people or on future property stability. In this regard, Roman law developed an early concept according to which the legitimate exercise of rights requires rational conduct compatible with conservation, balance, and social utility. According to Domingo (2018), this concept constitutes one of the most important historical precursors to modern principles related to the abuse of rights and the social function of property.

Another fundamental element of the *bonus vir* is to treat the property of others with the same care as one would one's own property. Various texts in the *Digest* establish that the usufructuary was required to preserve the substance of the thing in accordance with the principle *salva rerum substantia*. This duty entailed using the property in a manner that respected its essential nature and avoided alterations that would permanently affect its integrity. From a doctrinal perspective, this criterion once again reflects the existence of a minimum rational standard based on diligence, moderation, and financial responsibility (Kunkel, 1973).

The concept of *bonus vir* also extends beyond the strictly patrimonial sphere. Paulus notes that any person represented in court must be defended "in accordance with the discretion of a good

man." This expression demonstrates that even within procedural relationships, Roman law required honest and upright conduct. A legal representative could not act through deception, undue delays, or subterfuge intended to unjustly harm the opposing party. Africanus adds that one who deliberately deceives the plaintiff to prevent the conclusion of the proceedings does not act as a good man, thereby reinforcing the idea that the Roman legal system deeply valued honesty and good faith in the exercise of procedural rights (Schulz, 1951).

From this perspective, the *boni viri arbitratu* constitutes much more than an abstract legal clause. It is a true normative model of human behavior based on prudence, honesty, and social rationality. Roman jurisprudence used this concept to distinguish between legitimate and illegitimate conduct in the exercise of various rights and legal relationships. Those who acted as a bonus viri deserved legal protection; those who seriously deviated from these standards could face restrictions, sanctions, or the loss of certain legal protections (Marzoa, 1981).

Contemporary Roman law scholarship has noted that this legal standard bears significant similarities to modern concepts such as the "good family man," reasonable diligence, or the objective standard of conduct currently used in civil liability. All these categories share a common idea: the law presupposes certain minimum standards of rationality and prudence required of any individual in social coexistence. Consequently, the boni viri arbitratu can be considered one of the most relevant historical precursors to modern legal standards of diligence and good faith (Zimmermann, 1996).

Furthermore, this concept demonstrates that Roman law did not conceive of rationality solely from an abstract intellectual dimension, but primarily from a practical and social perspective. The rational man was one capable of acting prudently, respecting the interests of others, foreseeing consequences, and behaving honestly within his legal relationships. Roman legal rationality thus possessed a profoundly ethical dimension linked to moral correctness and social balance (Bretone, 2003).

Finally, an analysis of the *boni viri arbitratu* reinforces the central hypothesis of this research: the Roman legal system implicitly constructed an ideal prototype of a human being characterized by prudence, honesty, diligence, and a minimum level of rationality. This model did not remain solely within the philosophical or moral realm but produced concrete legal consequences regarding the recognition, limitation, or protection of certain behaviors. Through the *bonus vir*, Roman jurisprudence integrated law, ethics, and rationality into a single normative standard aimed at preserving balance and justice within social coexistence.

Dolo, Culpa, and Intimidation as Mechanisms for Assessing Human Conduct

The Roman legal system developed multiple mechanisms aimed at legally assessing human conduct based on elements related to will, rationality, intent, and degree of diligence. Within this context, the concepts of dolo, culpa, and intimidation constitute fundamental categories because they reveal how Roman jurisprudence distinguished between rationally acceptable behaviors and conduct considered socially harmful or morally reprehensible. An analysis of these legal concepts demonstrates once again that Roman law did not evaluate only the material outcome of human acts, but also the psychological and rational conditions under which they were carried out (Kaser, 1982).

Marcian developed a particularly relevant classification of the ways in which crimes are committed, noting that crimes could be committed "intentionally, in the heat of the moment, or

by chance." According to the jurist, those who act deliberately through planning or premeditation commit offenses intentionally; those who act impulsively for example, while intoxicated commit offenses in the heat of the moment; whereas a fortuitous event occurs when harm happens accidentally without any intent to cause harm. This classification reveals that Roman jurisprudence attached enormous importance to the psychological and rational components of human behavior when assessing legal liability and punishment (Schulz, 1951).

Dolo occupies a central place within this evaluative framework because it represents the most serious form of rational and moral deviation within legal relationships. Ulpian explains that the praetorian edict against dolo was created to protect people from deceitful, cunning, and fraudulent individuals who sought to obtain unjust advantages through manipulation and fraud. The Roman legal system considered this type of behavior particularly reprehensible because it involved the conscious use of intelligence and will to harm another. Consequently, dolus constituted not only a legal offense but also conduct deeply contrary to the Roman ideal of honesty and social rectitude (Bretone, 2003).

Labeo defined malicious intent as any cunning, deception, or scheme employed to deceive or defraud another. This definition is particularly significant because it identifies malicious intent ( ) as a perverse use of human rationality. The fraudulent individual does not act irrationally out of ignorance or error, but rather deliberately uses his intellectual capacities to obtain unjust benefits through deception. From this perspective, Roman law condemns not only the financial harm caused, but also the moral perversion of human intelligence directed toward fraud and manipulation (Marzoa, 1981).

The gravity attributed to fraud is clearly reflected in the legal consequences imposed by Roman case law. The perpetrator could be convicted through the actio de dolo and also suffer a mark of infamy, a sanction that entailed a considerable decline in public esteem and limitations within their legal sphere. Infamy constituted much more than a mere financial penalty, as it represented a social and moral judgment on the individual's lack of honor. This demonstrates once again that Roman law closely linked law and morality when assessing certain human behaviors (Kunkel, 1973).

The praetor's intervention to annul fraudulent agreements also demonstrates that the Roman legal system did not recognize the full validity of legal acts obtained through fraud or manipulation. Although the principle of pacta sunt servanda conferred binding force on agreements entered into between private parties, Roman jurisprudence held that contractual intent must be free from fraudulent conduct to merit legal protection. Consequently, the law did not protect every formally concluded agreement, but only those compatible with minimum standards of honesty and social rationality (Zimmermann, 1996).

Another significant example of the legal assessment of conduct appears in cases involving the corruption of slaves. The Praetorian Edict penalized anyone who fraudulently persuaded another person's slave to act improperly, flee, steal, falsify accounts, or behave in a manner harmful to his or her owner. Although these provisions were developed within a slave-owning society profoundly different from contemporary systems, they are relevant because they reveal what types of conduct were considered incompatible with the social behavior expected within the Roman community (Biondi, 1965).

The examples cited by jurists reveal that Roman law rejected behaviors characterized by disorder, deceit, disloyalty, and a lack of self-control. The figure of the seditious individual, the vagrant, or the person perpetually devoted to public spectacles was viewed negatively because it represented a deviation from the Roman ideal of moderation and responsibility. In this way,

jurisprudence not only regulated specific legal acts but also projected certain cultural and rational values onto socially acceptable behavior (Domingo, 2018).

On the other hand, culpa constitutes a distinct category because the resulting harm does not stem from malicious intent, but rather from negligence, carelessness, or a lack of sufficient diligence. Roman case law made a specific distinction between aquilian culpa and contractual culpa, although in both cases the central element lay in the absence of the care reasonably required under certain circumstances. This category is particularly important because it allows us to identify the degree of foresight and prudence that Roman law considered legally required of any rational individual (Stein, 1999).

Paulus defined culpa by stating that it exists when someone fails to foresee what a diligent person could have foreseen or when they notice a danger too late, even though it could still have been avoided. This definition clearly introduces an objective standard of conduct based on rational foreseeability. The legally liable individual is not only one who intentionally causes harm, but also one who acts with a degree of carelessness incompatible with the behavior expected of a prudent person. Consequently, the Roman legal system required a minimum level of attention and practical rationality within social coexistence (Schulz, 1951).

Of particular relevance is the concept known as culpa lata, defined by Ulpian as "excessive negligence" consisting of "failing to understand what everyone understands." This concept is fundamental to the central hypothesis of this research because it explicitly presupposes the existence of a minimum level of rational knowledge shared by society. Culpa ceases to be considered mere negligence when the conduct in question seriously deviates from the basic standard of rationality expected within the community. For this reason, Roman case law even went so far as to equate culpa lata with intent in certain cases (Kaser, 1982).

The existence of culpa lata clearly demonstrates that Roman law presupposes a general model of rational and prudent conduct. The legal system expected any individual to possess a certain basic level of discernment regarding obvious dangers and foreseeable consequences. When a person was unaware of what "everyone understands," their conduct was considered legally intolerable due to the extreme irrationality demonstrated. In this sense, Roman jurisprudence implicitly established a collective standard of minimum rationality required in social life (Marzoa, 1981).

Intimidation, or *metus*, constitutes another relevant institution for understanding how Roman law assessed human behavior from psychological and rational perspectives. This offense occurred when a person entered into a legal transaction under serious threat and well-founded fear. As in the case of intent, the victim had the right to bring a criminal action, and the perpetrator could suffer a mark of infamy. The legal system considered the use of fear as a means of coercion to be particularly serious because it directly affected the freedom and rationality of human will (Zimmermann, 1996).

However, Roman case law established certain limits regarding the applicability of this protection. Ulpian maintained that the fear had to be experienced by a "most steadfast man" that is, a reasonably courageous and rational person, not someone who was excessively fearful or impressionable. Likewise, the fear had to stem from a serious and objective threat, not from mere unfounded suspicions. These criteria demonstrate once again that Roman law evaluated human conduct using objective parameters of socially shared rationality (Bretone, 2003).

Consequently, legally relevant intimidation did not depend solely on the victim's subjective perception, but also on a rational assessment of the severity and credibility of the threat. The Roman legal system understood that a certain degree of rational and emotional fortitude should

normally be expected of any individual. Only when fear was reasonably justified could it be considered legally relevant for invalidating acts or imposing sanctions on the intimidator (Stein, 1999).

Finally, a joint analysis of intent, negligence, and intimidation reveals that Roman jurisprudence developed sophisticated mechanisms for legal assessment based on rationality, volition, and foreseeability. Roman law did not conceive of liability exclusively from a material perspective, but also from psychological and moral ones. Human conduct was constantly compared to ideal standards of prudence, honesty, and reasonableness, progressively consolidating a true legal prototype of rational behavior within Roman social life.

The condictio ob turpem vel iniustam causam and the Moral Limits of Law

Roman law developed multiple mechanisms aimed at preventing the legal system from protecting acts considered immoral or contrary to the basic principles of social propriety. Within this context, the condictio ob turpem vel iniustam causam represents one of the most important institutions for understanding how Roman jurisprudence integrated ethical elements into the legal assessment of human conduct. An analysis of this legal concept demonstrates that the Roman legal system did not provide indiscriminate protection for any act voluntarily entered into between private parties, but only for those acts compatible with certain minimum standards of morality and social rationality (Zimmermann, 1996).

Book XII, Title V of the Digest specifically addresses the circumstances in which the condictio applies when a transfer of property has been made for a base or unjust cause. Roman case law carefully examined both the conduct of the party making the transfer and that of the recipient, assessing whether any of the parties involved had acted immorally. This analysis reveals that Roman law did not limit itself to verifying the formal requirements of legal acts but also evaluated their moral and social content before granting legal protection (Kaser, 1982).

The notion of "turpitude" used in these legal sources should not be understood as a mere lack of intelligence or intellectual incapacity, but rather as a reference to morally incorrect or socially reprehensible conduct. The term turpitudo refers to acts contrary to the honesty, decorum, and moral rectitude expected within Roman social life. Consequently, when a legal act was based on a turpitudo, case law considered it inappropriate to grant judicial protection to anyone seeking to benefit from such an immoral situation (Bretone, 2003).

One of the fundamental principles derived from this legal institution is that the law does not protect anyone who bases their claim on their own immoral conduct. If a party delivers something in the expectation that the recipient will commit a turpitudo or an unlawful act, that party cannot subsequently turn to the legal system to claim restitution or performance. Conversely, when the party making the transfer acts precisely to prevent immoral conduct on the part of the recipient, case law does allow for the recovery of what was transferred. This demonstrates that the Roman legal system evaluated the purpose pursued by the parties from an ethical standpoint before deciding whether to grant or deny legal protection (Marzoa, 1981).

Roman case law also developed the principle that "no one may invoke their own turpitude," later formulated as nemo auditur propriam turpitudinem allegans. This criterion clearly expresses the idea that the law must not become an instrument for promoting conduct that is immoral or contrary to the fundamental values of the community. An individual who voluntarily engages in reprehensible acts forfeits the right to subsequently seek legal protection against the consequences arising from their own behavior (Schulz, 1951).

It is particularly important to note how this legal principle once again reveals the existence of an implicit model of rational and moral conduct within Roman law. Case law presupposes that a reasonable individual should not voluntarily engage in socially dishonest or morally wrong acts. When someone acts, motivated by improper motives, the legal system considers their conduct to be a serious deviation from the standard expected in social coexistence and, consequently, limits or denies legal protection to their claims (Stein, 1999).

Furthermore, the condictio ob turpem causam demonstrates that Roman law recognized a close relationship between rationality and morality. Irrational conduct was not identified solely with a lack of intelligence or foresight, but also with ethical deviations incompatible with the ideals of honesty and social rectitude. In other words, acting rationally also implied behaving in accordance with certain minimum standards of morality recognized by the Roman legal community (Domingo, 2018).

Another relevant aspect is that this legal institution reveals substantive limits to the principle of freedom of contract. Although Roman law recognized broad contractual freedom, that freedom was not absolute nor could it be validly exercised for immoral or unjust purposes. The Roman legal system held that human will deserved recognition only when it remained within certain ethical limits compatible with the stability and propriety of the social order. This conception constitutes one of the most important historical precursors to modern doctrines related to public order and public morals (Zimmermann, 1996).

The relationship between morality and law becomes particularly clear when Roman case law denies a cause of action even in cases where both parties voluntarily engaged in reprehensible conduct. In such cases, even if the parties are "equally immoral," the status of the possessor is deemed preferable. This demonstrates that Roman law preferred to leave those who deliberately deviated from the moral and rational standards considered fundamental to legal coexistence without protection (Biondi, 1965).

From a philosophical-legal perspective, the condictio ob turpem vel iniustam causam demonstrates that Roman jurisprudence conceived of law not only as a technical system for regulating property but also as an instrument aimed at preserving certain ethical values essential to social life. The legal order was intended to promote honesty, prudence, and moral rectitude, while rejecting conduct incompatible with human dignity and rationality. Consequently, this legal institution significantly strengthens the central hypothesis of this research regarding the existence of an ideal prototype of human conduct implicitly constructed by the Roman legal system (Marzoa, 1981).

The Prototype of the Rational Human Being within the Roman Legal System

A joint analysis of the institutions studied supports the argument that Roman law implicitly developed a true legal prototype of the human being based on minimal rationality, prudence, honesty, and moral integrity. Although Roman sources do not expressly formulate a general theory regarding the rational nature of the individual within the legal order, numerous passages in the Digest reveal the existence of consistent normative criteria aimed at evaluating human conduct according to certain ideal standards of behavior (Schulz, 1951).

One of the main elements comprising this legal prototype is the requirement for prudence and rational foresight within social relations. The concept of *boni viri arbitratu* clearly demonstrates that the Roman legal system expected people to behave in a moderate, diligent, and responsible

manner with regard to the exercise of their rights. The rational individual was expected to use the property of others prudently, to foresee normal and y consequences of their actions, and to avoid abusive or destructive conduct. Irrationality was associated with excess, negligence, and a lack of moderation (Kaser, 1982).

Likewise, Roman jurisprudence required honesty and moral rectitude as fundamental conditions for granting legal protection. The rejection of willful acts, the punishment of fraudulent conduct, and the denial of legal protection in cases of reckless behavior clearly reflect that Roman law viewed behaviors characterized by deception, manipulation, or deliberate immorality negatively. An individual legally worthy of protection was expected to act in accordance with minimum standards of good faith and social propriety (Marzoa, 1981).

The existence of categories such as culpa lata is particularly revealing regarding the construction of a collective standard of rationality. When Ulpian defines this concept as "failing to understand what everyone else understands," he explicitly presupposes that there is a certain basic level of socially shared discernment that is required of any individual. Roman jurisprudence considered it legally intolerable to deviate seriously from this minimum standard of practical rationality. Consequently, Roman law did not conceive of absolute individual freedom divorced from social expectations of rational behavior (Stein, 1999).

Another fundamental aspect is the close relationship between morality and law within Roman legal thought. Unlike contemporary conceptions characterized by a strict separation between these two spheres, classical jurisprudence consistently integrated ethical criteria into the legal assessment of human conduct. Concepts such as good faith, honesty, prudence, and rectitude did not appear merely as abstract moral ideals, but also as genuine normative parameters capable of producing concrete legal consequences (Bretone, 2003).

Nor was the rationality required by the Roman legal system purely intellectual or abstract in nature. The rational individual was primarily one capable of behaving correctly within social coexistence, respecting the interests of others, and acting in accordance with basic principles of balance and moderation. Roman legal rationality thus possessed a deeply practical and ethical dimension aimed at ensuring stability and harmony within social relations (Domingo, 2018).

Furthermore, it is important to note that many contemporary categories related to objective good faith, reasonable diligence, and abuse of rights retain significant elements originating in these Roman constructs. The modern standard of the "good family man," for example, clearly reflects the historical influence of the Roman bonus vir as an ideal model of prudent and responsible conduct. This demonstrates that Roman conceptions of legal rationality continue to exert a significant influence on contemporary legal thought (Zimmermann, 1996).

From a contemporary perspective on legal and academic education, various studies argue that legal education should foster critical, ethical, and rational skills aimed at strengthening the social responsibility of legal professionals. Cárdenas-Palomino et al. (2024) point out that current trends in higher education prioritize educational models based on critical reasoning, normative interpretation, and the ethical construction of knowledge elements closely related to the ideals of prudence, diligence, and rationality found within the classical Roman legal tradition. Consequently, the study of these historical categories retains relevance not only in terms of legal doctrine but also pedagogically within contemporary legal education.

This research also leads to the conclusion that the Roman legal system did not conceive of human beings solely as subjects with rights and obligations, but as members of a political and moral community where certain behaviors were expected and others rejected because they were considered incompatible with rationality and social propriety. Consequently, Roman law

simultaneously developed a regulatory and pedagogical function aimed at promoting certain ideals of behavior within Roman society (Biondi, 1965).

Finally, it can be asserted that the various institutions analyzed reveal conceptual coherence within Roman jurisprudence regarding the evaluation of human conduct. Natural law, boni viri arbitratu, dolo, culpa, intimidation, and torpes causes constitute distinct manifestations of the same legal logic based on the requirement of a minimum level of rationality and morally correct behavior. The Roman legal system thus constructed a true normative paradigm of the prudent, honest, and rational human being as the foundation for numerous classical legal institutions.

Conclusions

An analysis of Roman legal sources allows us to affirm that the Roman legal system implicitly developed an ideal model of human conduct based on a minimum level of rationality, prudence, honesty, and moral correctness. Although the sources do not expressly elaborate a systematic theory regarding the rational nature of the individual within the law, numerous legal institutions reflect normative criteria aimed at evaluating human behavior in accordance with certain ideal standards of social and legal conduct.

The research revealed that Roman natural law constituted one of the earliest conceptual foundations of this normative framework. Classical jurisprudence held that certain behaviors related to coexistence, justice, self-defense, and patrimonial balance derived directly from the rational and social nature of human beings. Consequently, Roman law did not conceive of legal relationships solely as the product of arbitrary will, but also as manifestations of rational principles inherent in communal life.

Likewise, the concept of *boni viri arbitratu* clearly demonstrated the existence of an objective legal standard based on prudence, diligence, and moderation. The rational individual was expected to exercise their rights while avoiding abuse, deterioration, or irrational exploitation of others' property. The Roman legal system expected behavior consistent with the preservation of property, predictability, and social responsibility, rejecting conduct motivated exclusively by ambition or negligence.

The study of intent, negligence, and intimidation revealed that Roman jurisprudence placed great value on the psychological and moral dimensions of human behavior. The severity attributed to fraud, deception, and manipulation demonstrates that Roman law particularly condemned those acts in which intelligence and will were deliberately used to harm others. Furthermore, the doctrinal construction of culpa lata reveals that there existed a collective standard of minimum rationality required of any individual within society.

The condictio ob turpem vel iniustam causam likewise confirmed the close relationship between law and morality within Roman legal thought. The legal system denied protection to those who based their claims on immoral or socially reprehensible acts thus consolidating the idea that legal protection must be limited by basic ethical principles related to honesty and social propriety.

Taken together, the institutions analyzed support the argument that Roman law constructed a true legal prototype of a rational human being characterized by prudence, good faith, and social responsibility. This model did not remain solely in the philosophical realm but produced concrete legal consequences regarding the recognition, limitation, or denial of legal protection in response to certain behaviors.

Finally, it can be concluded that many contemporary categories related to objective good faith, reasonable diligence, and abuse of rights continue to reflect elements originating in these classical Roman concepts. Consequently, the study of legal rationality within Roman law is not only historically significant but also holds profound dogmatic and philosophical importance for understanding the evolution of Western legal systems and the enduring relationship between law, morality, and human behavior.

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Indigenous and Afro-descendant Intellectual Property: Between Res Nullius, Public Goods, and Collective Goods

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Introduction

The misappropriation of the traditional knowledge of Indigenous and Afro-descendant communities is one of the most significant issues in the field of legal protection of cultural heritage in Latin America. The value placed on traditional knowledge both technical knowledge and that linked to cultural expressions and folklore has grown exponentially in recent decades, encouraging its commercial exploitation by third parties and, in many cases, leading to situations of misappropriation (Esborraz, 2025). This phenomenon is part of what anthropologists call "cultural appropriation," which consists of the act of using elements from other cultures generally without showing any respect for them and is usually accompanied by connotations of exploitation and domination, since such uses are carried out without authorization from the community to which they belong and without any compensation.

In recent decades, economic globalization and the development of cultural industries have significantly increased commercial interest in the traditional knowledge and cultural expressions of indigenous peoples and Afro-descendants. Ancestral medicinal practices, textile designs, traditional agricultural techniques, artistic expressions, and knowledge associated with biodiversity have become resources of high economic value for pharmaceutical, biotechnology, cosmetics, and fashion companies. However, this growing economic value has not always been accompanied by adequate mechanisms for the recognition and legal protection of the communities that have historically generated, preserved, and transmitted this knowledge.

This issue takes on particular significance in Latin America, a region characterized by extraordinary biological and cultural diversity. Numerous indigenous peoples and Afro-descendant communities have, over the centuries, developed their own systems of knowledge closely linked to their territories, worldviews, and forms of social organization. This knowledge constitutes a manifestation of cultural diversity and an essential component of the collective identity of these peoples; for this reason, its unauthorized use goes beyond mere economic implications to also affect fundamental cultural rights.

The specialized literature has emphasized that contemporary legal systems were designed primarily to protect individual, novel creations that are susceptible to economic exploitation circumstances that do not always correspond to the nature of traditional knowledge. This situation creates significant regulatory gaps that facilitate misappropriation, biopiracy, and commercial exploitation without prior consent or equitable benefit-sharing (Dutfield, 2011; Chennells, 2016). Consequently, a broad international debate has emerged regarding the need to reformulate existing legal frameworks to incorporate approaches more compatible with the collective rights of indigenous peoples and people of African descent.

Today, claims related to intellectual property have almost surpassed in importance those regarding land rights, which historically have taken precedence in indigenous mobilizations, although both types of issues are closely interrelated (as recognized by the Inter-American Court of Human Rights in the cases Indigenous Community of Yakye Axa v. Paraguay, judgment of

June 17, 2005, para. 154, and Kichwa Indigenous People of Sarayaku v. Ecuador, judgment of June 27, 2012, para. 212).

From this perspective, the purpose of this chapter is, first, to analyze the rights that indigenous and Afro-descendant communities hold over their traditional knowledge and, second, to identify the most appropriate legal instruments for its protection, assessing whether current intellectual property laws are sufficient or whether, on the contrary, it is necessary to establish a specific legal framework that addresses the particular characteristics of this collective knowledge.

The growing attention given to traditional knowledge in contemporary social research stems not only from the need to strengthen legal protection mechanisms for indigenous peoples and people of African descent, but also from an interest in understanding the dynamics of recognition, inclusion, and justice that permeate Latin American societies. Within this framework, scholarly work conducted at universities across the region has emphasized the importance of generating research aimed at addressing complex social issues through critical and interdisciplinary approaches (Barros & Bores, 2024), as well as promoting educational and research processes committed to building societies that are more inclusive and respectful of cultural diversity (Cárdenas-Palomino et al., 2024).

To address this issue, it is pertinent to revisit the classical classification of things (res) developed by the Roman legal tradition and set forth in a well-known passage from Justinian's *Institutes* (I.2.1 pr.), which distinguishes between things common to all by natural law (res communes omnium naturale iure), public things (res publicae), things belonging to a community or collective (res universitatis), things belonging to no one (res nullius), and privately owned things (res singulorum) (Petrucci, 2015).

Instances of Misappropriation of Traditional Cultural Expressions in the Fashion Industry

Before examining the legal aspects of this issue, it is pertinent to analyze some paradigmatic cases of misappropriation of traditional cultural expressions by the fashion industry, as they constitute illustrative examples of the vulnerable situation in which Latin American indigenous communities frequently find themselves in the face of the commercial exploitation of their cultural heritage (Esborraz, 2025).

Among these, the case that has received significant media attention also because it is the only one that has so far reached a court (although the lawsuit was not filed by the affected indigenous community) is that of French fashion designer Isabel Marant, who had copied, for one of the garments in her spring-summer 2015 collection, the huipil (a type of shirt or tunic) worn by women of the Mixe people in the Mexican state of Oaxaca. The paradox of this case lies in the fact that Ms. Marant indirectly acknowledged the plagiarism during a trial in which she had to defend herself against accusations of counterfeiting and unfair competition brought by another French fashion company, Antik Batik, which claimed that the garment in question was a copy of a tunic from its fall-winter 2014–2015 collection.

Ms. Marant argued in her defense that she had already marketed, in 2009–2010, a tunic similar to the one at the center of the dispute, designed with inspiration drawn from the traditional clothing of Mixe women, and presented as evidence of her inspiration among other things several photographs from the Textile Museum of Oaxaca. In light of this evidence, the Paris Court of First Instance ruled that neither of the companies involved in the dispute could claim originality or copyright over the designs in question, because all of their characteristics had been taken

almost without modification or other additions from the huipil worn by Mixe women (Posłuszny; 2020). Nevertheless, since the community in question was not a party to the lawsuit, it received no financial compensation and had to settle for a form of media-based sanction (through the use of social media) aimed at damaging the reputation of the accused companies (which forced them to issue a public apology and withdraw the products in question from the market).

Another case that has garnered significant attention involved the U.S. company Nike, which had to cancel the 2019 launch of a sneaker model called the Nike Air Force 1 Puerto Rico 2019. This model reproduced traditional motifs from the mola of the Guna indigenous people of Panama and Colombia, which had been used not only without their prior authorization but also by erroneously attributing them to the people of Puerto Rico. Images of the shoes in question, which quickly circulated on social media, sparked outrage and criticism from indigenous activists and authorities, prompting Nike in addition to apologizing for the erroneous attribution to refrain from marketing the sneakers, thereby avoiding the payment of royalties to the Guna people for the improper and misrepresented use of the mola (Barsotti and Simoni, 2020; Celigueta and Martínez, 2020).

Multilevel recognition of the rights of indigenous and Afro-descendant communities in Latin America over their traditional knowledge.

From a legal perspective, the analysis must focus, first and foremost, on identifying the rights held by indigenous and Afro-descendant communities over their traditional knowledge. In this regard, it is worth noting that, at the international level, the first measure specifically designed to protect indigenous and tribal peoples is Convention No. 169 of the International Labor Organization (ILO) of 1989, which imposed on governments the duty to adopt measures aimed, among other things, to recognize and protect the social, cultural, religious, and spiritual values and practices of these peoples (Art. 5); to apply national legislation while taking into account their customs and their own institutions (Art. 8); and to strengthen and promote their handicrafts, community-based industries, and traditional activities (Art. 23).

However, it took nearly twenty years for the United Nations (UN) to adopt, in 2007, the Declaration on the Rights of Indigenous Peoples, in which the obligations of governments established by the ILO Convention were directly translated into universal human rights recognized for these peoples. Of particular relevance here, the UN Declaration granted Indigenous peoples for the first time in an international instrument the right to their traditional knowledge and cultural expressions, as well as to the manifestations of their sciences, technologies, and cultures (Art. 31.1); and the right to maintain, control, protect, and develop their intellectual property over such cultural heritage and to adopt effective measures to protect these rights (Art. 31.2).

Paradoxically, it took even longer for the Organization of American States (OAS) to adopt its counterpart regional declaration, which was not approved until 2016. This other Declaration is, in principle, consistent with the UN Declaration regarding the protection afforded to cultural heritage and indigenous intellectual property, but it regulates both concepts even more comprehensively and places special emphasis on their collective nature (Art. XXVIII).

In addition to international law, the protection of the rights of indigenous and Afro-descendant communities (including their traditional knowledge) has also been gaining ground in the constitutions of Latin American countries, especially since the 1980s, through a series of

constitutional reforms aimed at recognizing the multicultural and pluralistic nature of Latin American society.

This paradigm shift has resulted in the recognition of a series of distinct collective rights (cultural, political, and territorial) for indigenous and Afro-descendant communities, in order to protect their cultural identity and legal autonomy. Among these rights, some Constitutions also explicitly refer to the recognition, preservation, promotion, enhancement, development, and protection of collective knowledge or collective intellectual property, prohibiting its appropriation by third parties and, in certain cases, the registration of patents on such knowledge.

From the sources (both international and national) mentioned above, it follows that indigenous and Afro-descendant communities have a right to their own traditional knowledge, as an integral part not only of their "possessions" (that is, their cultural heritage) but also of their "being" (that is, their cultural identity), which requires the adoption of a whole series of effective and appropriate protection mechanisms that take into account the collective, multigenerational, and holistic nature of such ancestral knowledge.

Traditional knowledge possesses particular characteristics that make it difficult to classify within the classical legal categories developed by modern Western law. Unlike creations protected by conventional intellectual property systems, this knowledge is the result of historical processes of collective construction that unfold over several generations and are closely linked to the cultural identity of a given community.

From an anthropological perspective, traditional knowledge constitutes complex systems of knowledge, practices, and innovations developed by local and indigenous communities in constant interaction with their natural and social environment. This knowledge encompasses diverse fields, such as traditional medicine, agricultural techniques, the use of biological resources, artistic expressions, rituals, music, oral traditions, and ecological knowledge accumulated over centuries of collective experience.

One of the main characteristics of this knowledge lies in its collective nature. While traditional intellectual property is based on the identification of an individual author or inventor, traditional knowledge is typically created, preserved, and transmitted by entire communities. Ownership cannot be attributed to a specific person, as it is the result of cumulative contributions made by multiple generations of community members.

Furthermore, this knowledge is deeply rooted in the territory. Various studies have shown that traditional knowledge cannot be understood in a ly isolated from the geographical and cultural spaces where it originates, since its development depends on the historical interaction between communities and the ecosystems they inhabit (Berkes, 2017). This relationship explains why the protection of traditional knowledge is closely linked to the defense of indigenous territorial rights.

Another relevant characteristic is its dynamic nature. Contrary to the perception that it constitutes static manifestations of the past, traditional knowledge is in a state of constant transformation and adaptation. Communities incorporate new experiences and continually reinterpret their cultural practices to respond to social, economic, and environmental changes. Consequently, any legal framework designed to protect this knowledge must recognize its evolving nature and avoid overly rigid or folklorizing conceptions.

From this perspective, understanding traditional knowledge as collective assets allows us to overcome the limitations of traditional legal categories and provides a more appropriate conceptual basis for its protection. This approach simultaneously recognizes the heritage,

cultural, identity, and community dimensions of such knowledge, thereby promoting the development of legal mechanisms compatible with the needs and expectations of the communities that hold this knowledge.

The Limitations of Conventional Intellectual Property with Regard to Traditional Knowledge: Between Res Nullius and Public Goods.

However, current regulations both international and national on copyright and industrial property continue to be based on the liberal and individualistic principles of the 19th century (focused exclusively on personal fulfillment and the protection of economic interests) and consist of rules drafted according to the model of individual rights protection (very similar to that of private property), which a priori excludes the existence of collective rights, and is therefore ill-suited to the requirements of protecting the traditional knowledge of indigenous and Afro-descendant communities (understood as a kind of "collective asset" subject to collective ownership).

Thus, for example, with regard to copyright in order to guarantee the assertion of authorship of a work and the right to oppose any distortion, mutilation, or other modification of it, as well as its unauthorized economic exploitation it is required that the work be a product of an individual's imagination, that its originality be verifiable, that it be relatively recent, and that it be normally fixed in a tangible medium. Furthermore, the protection of this right at least with regard to its economic aspect is of limited duration.

In contrast, traditional knowledge is generally characterized by a lack of individuality (since it is the work of a specific community), a lack of originality (because it is transmitted from generation to generation), a lack of contemporaneity (since it is developed and reworked over time), and, furthermore, it is not usually fixed in tangible forms (since it is transmitted primarily orally or by imitation). Furthermore, traditional knowledge is characterized by not having been created for commercial purposes.

All of this highlights the inadequacy of conventional intellectual property law, which fails to take into account the distinctive characteristics of traditional knowledge, thereby leaving it outside its scope of application. This regulatory gap means that such knowledge is considered to belong to no one or to be ownerless (res nullius) and, therefore, in the public domain, thus allowing for its free use and commercial exploitation by anyone interested in doing so.

This, too, is a remnant of the nineteenth-century legal approach to which I previously referred, which resulted in the simplification carried out by civil codification regarding property, by virtue of which the aforementioned (see § I) classification of things in the Roman legal tradition (res communes omnium, res publicae, res universitatis, res nullius, and res singulorum) was largely reduced to the dichotomy "public property–private property," with the elimination of the categories of "common property" and "collective property" (which were reabsorbed into the category of ownerless property and/or that of public property).

The latter was the criterion that initially guided the proposed solutions aimed at remedying this gap by drawing upon the rules applicable to the protection of "works by unidentified authors," introduced in the 1967 Stockholm Revision of the 1886 Berne Convention for the Protection of Literary and Artistic Works (Art. 15.3.4.a). The purpose of this addition was to protect what was previously referred to simply as folklore (whereas today it is known as traditional cultural expressions), resorting to the fiction of the unknown author (always applying an individualistic logic) to justify the State's appropriation of ancestral knowledge. In this way, what are in reality

"collective assets" (belonging to a specific Indigenous or Afro-descendant community) were ultimately transformed into "public assets" (which, given the general inaction of state authorities to protect them, effectively become res nullius).

The debate surrounding the protection of traditional knowledge must also be addressed from the perspective of legal pluralism and contemporary processes of decolonization of the law. For much of Latin American history, indigenous and Afro-descendant legal systems were subordinated to state legal models inspired by European conceptions of property, individuality, and the market. This situation led to numerous collective rights remaining invisible or being interpreted through legal categories that did not adequately reflect the sociocultural realities of indigenous peoples.

In this context, various authors argue that the effective protection of traditional knowledge requires recognizing the coexistence of multiple legal systems within a single state. Legal pluralism allows us to understand that Indigenous and Afro-descendant communities have their own ways of regulating access to, use of, and transmission of their knowledge, which must be taken into account when designing legal protection mechanisms (Merry, 1988).

From this perspective, the adoption of special regulations should not be limited solely to the formal recognition of collective rights, but must also incorporate procedures for consultation and free, prior, and informed consent, as well as mechanisms for effective participation in decision-making related to the use of traditional knowledge. Legal protection is thus no longer conceived exclusively as a property rights issue but rather as a tool designed to strengthen the cultural self-determination of communities.

Recent experience in Latin America demonstrates significant progress in this direction. Countries such as Ecuador, Panama, and Mexico have incorporated specific provisions aimed at recognizing collective ownership of traditional knowledge and ensuring communities' share in the benefits derived from its use. Although significant implementation challenges remain , these initiatives represent a paradigm shift from traditional intellectual property models by recognizing that certain cultural assets cannot be understood exclusively through an individualistic or commercial lens.

Consequently, the contemporary debate revolves not only around the expansion of legal protection mechanisms but also around the need to transform the conceptual categories through which the law understands the relationship between culture, property, and community. The revaluation of collective assets constitutes, in this sense, a significant contribution to the construction of legal models that are more inclusive and compatible with the cultural diversity that characterizes Latin America.

Conclusions

The need for ad hoc legislation to protect the traditional knowledge of indigenous and Afro-descendant communities that reintroduces the category of collective assets. The distinctive characteristics of the traditional knowledge of indigenous and Afro-descendant communities particularly its collective and multigenerational nature and its close ties to the cultural identity of the peoples who generate and preserve it highlight the need to develop specific legal mechanisms aimed at ensuring effective protection against misappropriation.

The relevant legislation should, at a minimum, address the existing regulatory gaps regarding ownership, as well as control over such knowledge and remuneration or compensation for its use. As already recognized by the UN and OAS International Declarations on the Rights of

Indigenous Peoples and the constitutions of some Latin American countries, traditional knowledge should not be considered res nullius, nor should it be regarded as public property, but rather as belonging to the community that has generated or developed it (which may, in some cases, be more than one), preferably without the need for formalities to establish ownership (such as, for example, its constitutive registration) and with inalienable, unattachable, and imprescriptible or perpetual status (due, especially in the latter case, to its multigenerational nature).

These are, in effect, "collective assets," which may be used by members of the respective community and/or by their own representatives (hence they could also be called "community assets"), but not by private individuals on an individual and exclusive basis; which, however, should not preclude the possibility of authorizing the temporary economic use or exploitation of traditional knowledge in favor of third parties in exchange for fair and equitable financial compensation.

The collective ownership of traditional knowledge would also necessitate that control over its use be the responsibility of the community's decision-making bodies, in accordance with the procedures established by its customary law. Likewise, the collective nature of traditional knowledge would require the adoption of appropriate protection mechanisms, such as "class actions," with the consequent recognition of standing to sue for the authorities and/or representatives of the indigenous and Afro-descendant community concerned.

Most of these minimum requirements have been taken into account, at the international level, by the Draft Articles on Traditional Cultural Expressions and Folklore, which have been under negotiation for nearly two decades within WIPO's Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge, and Folklore, and, at the national level (in Latin America), by Panama's Law No. 20 of 2000 on the Special Regime for the Collective Intellectual Property of Indigenous Peoples; as well as by Ecuador's Organic Code on the Social Economy of Knowledge of 2016, which devotes the entire Title VI to "Traditional Knowledge"; and, finally, by Mexico's 2022 Law on the Protection of the Cultural Heritage of Indigenous and Afro-descendant Communities.

In closing, it is particularly important to highlight that all these regulatory initiatives share a common element: the revival of the legal category of collective assets as an ideal conceptual tool for addressing an issue closely linked to the social, cultural, and legal reality of Latin America. The gradual incorporation of this category into international instruments, special legislation, and civil recodification processes demonstrates not only the search for more appropriate legal solutions for the protection of traditional knowledge but also the consolidation of a distinct perspective in the development of regional law. In this regard, it can be asserted that such developments constitute a manifestation of the formation and prevalence, in contemporary Latin American law, of a true *mos latinoamericanus iura docendi ac legendi*; that is, a genuinely Latin American way of interpreting, teaching, and applying Roman legal sources, which joins with its own distinct identity the *mos italicus* and the *mos gallicus* of the European legal tradition.

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Pre-Contractual Abuses of Contractual Freedom

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Introduction

Private autonomy has historically been one of the fundamental pillars of modern civil law, especially since the consolidation of liberal thought and the gradual establishment of the contract as a central instrument of property transactions. Under this classical conception, freely expressed consent was considered sufficient to legitimize the content of the contract, since it was presumed that the parties acted under equivalent conditions of freedom and legal equality.

Consequently, the idea that a contract was intrinsically fair simply because it stemmed from the mutual consent of the contracting parties prevailed for a long time. However, contemporary economic development and the complexity of social relations have progressively demonstrated that the formal equality recognized by the legal system does not always correspond to true substantive equality between the contracting parties (Roppo, 2011). In this context, various schools of legal thought began to question the adequacy of the classical liberal paradigm in ensuring genuinely equitable contractual relationships, especially in cases where there are marked economic, technical, or informational asymmetries. As Perlingieri (2019) points out, the constitutionalization of private law entailed recognizing that contractual autonomy cannot be exercised without limit when its exercise compromises higher values linked to human dignity, substantive equality, and social solidarity.

This transformation led to a reinterpretation of general contract theory, shifting the emphasis from abstract freedom to the need to ensure minimum material conditions that allow for real and effective self-determination. Pre-contractual abuses of contractual autonomy represent precisely one of the most significant manifestations of this contemporary issue. Such phenomena occur when one party takes advantage of a position of superiority to unlawfully induce, condition, or pressure another person's will in the conclusion of a legal transaction.

In these cases, even though consent formally exists, contractual freedom is compromised by external circumstances that significantly reduce the aggrieved party's capacity for autonomous decision-making. Concerns regarding the protection of the weaker party gained particular prominence beginning in the second half of the 20th century, especially in areas such as labor relations, consumer contracts, and financial transactions. Legal experience has shown that the economically stronger party often imposes disproportionate contractual terms by taking advantage of situations of need, economic dependence, or lack of information. Consequently, contemporary law began to develop corrective mechanisms aimed at limiting the abusive exercise of private autonomy and ensuring higher levels of contractual justice (Mezzasoma, 2015).

Within this evolutionary process, the principle of good faith took on central importance as a guiding criterion for precontractual and contractual relationships. Good faith ceased to be understood solely as an ethical rule of conduct and became a true legal standard for regulating the parties' conduct. Consequently, the legal system began to require loyal, transparent, and cooperative behavior during negotiations, sanctioning conduct that creates imbalances incompatible with legitimate expectations and with the protection of human dignity (Zimmermann & Whittaker, 2000).

European regulatory developments also played a decisive role in this transformation. EU directives on consumer protection spurred the emergence of new legal categories aimed at regulating the content of contracts and sanctioning unfair terms that create significant imbalances between rights and obligations. In this regard, the so-called "protective nullity" emerged as an instrument designed to protect the vulnerable party against abusive contractual practices, moving beyond the traditional individualistic conception of the contract and reinforcing substantive control over the fairness of economic exchanges (Micklitz, 2015).

Based on these considerations, this chapter aims to analyze the evolution of pre-contractual abuses of contractual autonomy and the main legal mechanisms developed to protect the weaker party within contemporary contract law. To this end, the chapter examines legal institutions related to moral coercion, economic coercion, contractual rescission, nullity arising from mandatory rules, and precontractual liability, using the Italian legal experience as the primary reference and exploring its comparative implications within European and Latin American legal systems.

From a methodological standpoint, the research is conducted through a dogmatic-legal approach grounded in the doctrinal, normative, and jurisprudential analysis of the main civil law institutions related to the protection of private autonomy. This approach aligns with current research trends in the social and legal sciences, which emphasize the importance of documentary analysis and the critical review of academic sources as fundamental mechanisms for the construction of scientific knowledge and the understanding of complex phenomena within contemporary social contexts (Barros & Bores, 2024). Likewise, contemporary university research promotes the development of analytical and reflective skills aimed at generating rigorous and relevant knowledge for solving social and legal problems, thereby strengthening the scientific quality of documentary studies (Cárdenas-Palomino et al., 2024).

Pre-contractual abuses of autonomy and contractual weakness

The term "pre-contractual abuses of autonomy" refers to a broad range of behaviors through which one of the parties involved in contractual negotiations uses its position of advantage to unlawfully influence the other party's will, thereby limiting its capacity for self-determination. Such conduct may take the form of threats, exploitation of situations of need, manipulation of information, economic pressure, or the strategic use of structural inequalities that affect freedom of negotiation. Although consent may formally exist, reality shows that contractual intent can be seriously compromised when one of the parties lacks sufficient material conditions to negotiate on truly free and equal terms (Monzón, 2021).

The issue of contractual weakness arises precisely as a consequence of the classical liberal model's inadequacy in explaining complex contemporary economic dynamics. For much of the nineteenth century, the prevailing view held that a contract was necessarily fair because it represented the result of a free agreement between legally equal parties. However, the evolution of economic relations demonstrated that formal legal equality does not eliminate the profound economic, social, and informational inequalities that exist among people. Consequently, contractual freedom came to be understood not as an absolute given, but as a situation susceptible to being affected by power relations that materially limit one party's decision-making capacity (Atiyah, 1979).

From this perspective, contemporary legal doctrine distinguishes between poverty and contractual weakness. Poverty constitutes an objective condition linked to a lack of economic resources, whereas contractual weakness represents a relational situation that depends on the

specific context in which the negotiation takes place. Thus, even a financially solvent party may find itself at a disadvantage vis-à-vis another party that holds a dominant position in technical, financial, or informational terms. This distinction is fundamental because it allows us to understand that contractual vulnerability does not depend exclusively on a lack of assets, but also on structural factors that affect the actual possibility of negotiating on equal terms (Kennedy, 1982).

The transformation of contemporary private law is deeply linked to the recognition of this material inequality. Twentieth-century social constitutionalism introduced the idea that the State should not limit itself solely to guaranteeing formal freedoms but should also actively intervene to correct situations of inequality that impede the full development of the individual. In Italy, Article 3 of the Constitution marked a turning point by establishing that it is the Republic's responsibility to remove the economic and social obstacles that limit the freedom and equality of citizens. This provision provided the basis for creating protective mechanisms designed to counteract the effects of contractual weakness and abuses of economic power (Perlingieri, 2019).

One of the most representative examples of this legal evolution can be seen in the development of labor law. Initially, the relationship between employer and employee was conceived as an ordinary private contract based on the exchange of labor for compensation. However, historical experience demonstrated that the subordinate employee was structurally exposed to the employer's economic power, rendering the protection derived from the general rules of civil law insufficient. As a result, mandatory rules gradually emerged aimed at limiting private autonomy and guaranteeing minimum conditions of protection for workers, thereby consolidating an autonomous branch of law characterized by the protection of the weaker party in the legal relationship.

The expansion of protective mechanisms also extended to other contractual sectors, particularly consumer relations and banking contracts. In these areas, contemporary lawmakers have recognized that consumers and financial customers are often in a position of inferiority vis-à-vis companies endowed with economic power, technical expertise, and significantly greater bargaining power. This reality led to the development of regulatory controls over the content of contracts, allowing for the declaration of the invalidity of unfair terms that create significant imbalances between the rights and obligations of the parties.

According to Micklitz (2015), consumer protection constitutes one of the most evident manifestations of the transition from an individualistic conception of the contract toward a model based on criteria of substantive justice and substantial balance. In this context, mandatory rules have taken on central importance as instruments designed to limit the abusive exercise of private autonomy. Traditionally, a contract could only be invalidated when there were serious defects related to consent or the lawfulness of the subject matter. However, contemporary law has considerably expanded the scope of regulatory intervention by creating protective nullities aimed at safeguarding collective interests and protecting individuals considered structurally vulnerable.

Thus, nullity ceased to serve exclusively as a punitive measure and became also a mechanism for contractual balance and social protection (Morales Hervias, 2005). The evolution of Italian case law clearly reflects this expansive trend. Through what is known as "virtual nullity," the courts began to declare contracts or clauses contrary to mandatory rules invalid, even when the law did not expressly provide for such a consequence.

This phenomenon highlights the progressive constitutionalization of private law and the growing importance of principles such as good faith, equity, and social solidarity within contractual

interpretation. Judicial intervention is no longer limited to verifying the formal existence of consent but also examines whether the content of the contract is compatible with the fundamental values of the legal system (Rodotà, 2014). The progressive expansion of protective mechanisms against contractual weakness has generated significant doctrinal debates regarding the limits of private autonomy and the role the State should play in relations between private parties.

While some sectors believe that excessive regulatory intervention may undermine legal certainty and economic freedom, others argue that the absence of corrective mechanisms fosters scenarios of domination incompatible with human dignity and the principle of substantive equality. In any case, it is evident that contemporary contract law is increasingly oriented toward the construction of models of substantive justice capable of guaranteeing balanced contractual relationships that are compatible with the effective protection of the vulnerable party (Wilhelmsson, 2004).

The issue of pre-contractual abuses of autonomy ultimately demonstrates that contractual freedom cannot be understood solely as the formal absence of coercion. True autonomy requires minimum substantive conditions that allow individuals to make decisions free from abusive economic pressure, manipulation of information, or the illegitimate exploitation of situations of need. Consequently, contemporary law has evolved toward models of protection that recognize the need to control the abusive exercise of contractual power and to ensure that private autonomy operates in harmony with the constitutional principles of equality, solidarity, and human dignity.

Economic Weakness, Mandatory Provisions, and Nullity as Mechanisms of Contractual Protection

The contemporary evolution of contract law has shown that private legal relationships do not always unfold in scenarios of genuine balance between the parties. On numerous occasions, the economic, technical, or informational superiority of one of the contracting parties allows that party to impose contractual terms that are disadvantageous to the other party, creating situations incompatible with the principles of contractual justice and good faith. Faced with this reality, modern legal systems began to develop mechanisms of " " intervention aimed at limiting the abusive exercise of private autonomy through the imposition of mandatory rules designed to protect the structurally weaker party in the legal relationship (Roppo, 2011).

Mandatory rules represent one of the most important instruments for controlling abuses arising from contractual inequality. Unlike dispositive rules, whose application depends on the will of the parties, mandatory rules impose non-derogable limits designed to safeguard interests considered fundamental to the legal system. Within the contractual sphere, these provisions serve a protective function by preventing contractual freedom from being used to perpetuate situations of economic exploitation or legal subjugation.

Thus, contemporary law recognizes that private autonomy cannot validly operate when the content of a contract contradicts higher values linked to human dignity, substantive equality, and social solidarity (Perlingieri, 2019).

The expansion of mandatory rules is closely linked to the process of constitutionalizing private law that unfolded during the 20th century. The constitutional recognition of social and economic rights legitimized legislative intervention in relations between private parties, especially in cases where contractual freedom produces imbalances incompatible with substantive justice.

According to Rodotà (2014), the contract ceased to be conceived as a space entirely autonomous from the state and became an institution subject to the control of constitutional principles aimed at protecting individuals from situations of vulnerability.

Within this context, contractual nullity took on a protective function that goes far beyond its classical conception. Traditionally, nullity was understood as a sanction applied solely to contracts contrary to the law, public order, or public morals. However, contemporary law has considerably expanded the scope of this institution by creating new grounds for invalidity specifically designed to protect the weaker party in the contractual relationship. This gave rise to what is known as "protective nullity," characterized by its aim not only to defend legality in the abstract but also to preserve contractual balance and effectively protect the vulnerable contracting party (Rösler, 2010). One of the areas where this transformation was most pronounced was consumer law. Practical experience has shown that consumers often enter into contracts from a position of inferiority vis-à-vis large companies endowed with technical, economic, and informational superiority. In response to this problem, European legislation developed mechanisms designed to control unfair terms incorporated into contracts unilaterally drafted by professionals. Directive 93/13/EEC on unfair terms introduced criteria designed to sanction provisions that create significant imbalances between the rights and obligations of the parties to the detriment of the consumer, thereby strengthening substantive control over contractual content (Micklitz, 2015).

The incorporation of these guidelines into national legal systems brought about profound changes in general contract theory. In Italy, the Consumer Code introduced the possibility of declaring certain unfair terms null and void even if the consumer had formally given consent. This marked a break with the traditional liberal conception, according to which contractual acceptance necessarily implied validation of the content of the legal transaction. From that point on, the validity of a contract ceased to depend exclusively on formal consent and came to incorporate " " criteria related to substantive fairness and the material balance of the legal relationship (Roppo, 2011).

The protection derived from mandatory rules also extended to the financial and banking sectors. Transactions between financial institutions and customers revealed significant information asymmetries capable of seriously compromising users' contractual freedom. As a result, numerous legal systems began to impose specific formal requirements designed to ensure transparency, understanding, and informed consent. In certain cases, the absence of these requirements can result in the nullity of the contract or of certain clauses, thus constituting a formal nullity aimed primarily at protecting the contractual interests of the vulnerable party (Mak, 2014).

Case law also played a decisive role in expanding oversight of contractual content. Through what is known as "virtual nullity," courts began to declare contracts invalid if they violated mandatory rules, even when the law did not expressly provide for such a consequence. This phenomenon helped strengthen the legal system's ability to protect against abusive practices arising from economic inequality or the abuse of a dominant position. Cases related to anti-competitive agreements, abuse of economic dependence, and unfair commercial practices took on particular significance, where nullity became an instrument designed to restore contractual balance and prevent conduct contrary to free competition and good faith (Cafaggi, F. 2008; Whittaker, S. 2011).

However, the expansion of protective nullity has sparked intense doctrinal debates regarding its limits and effects. Some authors argue that the excessive use of mechanisms to invalidate

contracts can undermine legal certainty and weaken the stability of economic transactions. Others contend that corrective intervention is indispensable to prevent private autonomy from functioning as a mechanism for reproducing structural inequalities. In any case, contemporary developments demonstrate that contract law has progressively moved away from the classical individualist paradigm toward regulatory models that are more sensitive to situations of vulnerability and material imbalance (Wilhelmsson, 2004).

From this perspective, protective nullity is not merely a punitive measure but also an instrument of legal policy designed to ensure that contractual relationships are consistent with the constitutional principles of equality and human dignity. The legal system's intervention against abuses stemming from economic weakness responds to the need to build a genuinely free private autonomy, capable of developing under minimum conditions of balance and substantive justice. Consequently, the contemporary contract can no longer be interpreted exclusively as an abstract expression of individual freedom, but also as an institution subject to limits derived from the protection of the individual and the social function of economic relations.

Contractual Justice, Proportionality, and Termination in Response to the Abuse of Economic Weakness

The notion of contractual justice constitutes one of the central debates within the contemporary evolution of private law. For a long time, the prevailing view was that any freely entered into contract was necessarily just, since consent was considered a sufficient expression of freedom and legal equality. However, deep- economic and social inequalities revealed that formal consent does not always guarantee materially equitable outcomes. As a result, modern legal doctrine began to question the contract's immunity from judicial review regarding proportionality and economic balance (Atiyah, 1979).

Concerns about contractual justice arise particularly in situations where one of the parties is in a state of need, dependence, or economic vulnerability. In such cases, bargaining power is significantly diminished, making it easier for disproportionate terms to be imposed for the benefit of the stronger party. The legal issue no longer consists solely of verifying the existence of consent, but rather of determining whether that consent was given under conditions compatible with genuine self-determination and a reasonable balance between the contractual obligations (Kennedy, 1982).

Under Italian civil law, one of the classic mechanisms designed to address these situations is rescission on grounds of unfair advantage, governed by Articles 1447 and 1448 of the Italian Civil Code. This legal remedy allows a party to seek judicial rescission of the contract when one party took advantage of the other party's state of need to obtain an excessive benefit. Rescission represents an important historical precedent for judicial oversight of contractual equity, as it allows for the review of legal transactions that are formally valid but materially unfair (Monzón, 2021).

Traditionally, rescission requires three elements: the existence of a state of necessity, the counterparty's knowing exploitation of that situation, and a significant economic disparity between the performances. In the classic Italian model, this disparity had to exceed the so-called ultra dimidium that is, more than half the value of the affected consideration. These requirements reflect the legal system's intent to prevent the economic exploitation of extreme situations of vulnerability (Bianca, 2000).

However, the practical application of rescission has been limited due to the rigidity of its requirements and the difficulty of proving certain states of vulnerability in court. Contemporary economic relationships present more complex forms of inequality, linked not only to extreme economic need but also to technical dependencies, information asymmetries, and structural subordination that are difficult to prove in court (Wilhelmsson, 2004).

In light of these limitations, contemporary legal scholarship has developed a broader conception of contractual justice based on the principle of proportionality. From this perspective, contract review should not be limited solely to exceptional cases of extreme harm but should extend to all situations where the contractual content creates imbalances incompatible with good faith, equity, and human dignity. This evolution is particularly evident in European consumer law, where the notion of "significant imbalance" has made it possible to regulate unfair terms even in the absence of a strictly defined state of necessity (Micklitz, 2015).

Contractual proportionality functions as a criterion for assessing the reasonableness of the economic exchange between the parties. Although not every disproportion necessarily implies injustice, contemporary law recognizes that certain imbalances may reveal situations of abuse incompatible with the social function of the contract. Private autonomy thus ceases to depend exclusively on formal consent and becomes linked also to the effective protection of the vulnerable party and to the preservation of a minimum balance between reciprocal performances (Cartwright, 2007).

The strengthening of the principle of objective good faith has also contributed to the development of this view. Currently, good faith requires not only honesty during contract negotiation and performance but also avoiding the abusive exploitation of another party's vulnerability. Consequently, judicial intervention aimed at restoring contractual balance is justified as a necessary tool to ensure that private autonomy is exercised within parameters compatible with substantive equality and human dignity (Zimmermann & Whittaker, 2000).

Moral Violence and Economic Violence as Forms of Interference with Contractual Autonomy

The protection of contractual freedom constitutes one of the essential principles of contemporary private law. Consent can only be considered legitimate when it is freely and consciously given. However, there are various forms of pressure capable of significantly altering the will of the contracting parties. Among these, moral violence and economic violence stand out, both linked to situations of abuse arising from relationships of inequality and vulnerability (Bianca, 2000).

Moral coercion has traditionally been understood as a threat intended to instill fear in order to obtain contractual consent. Since the time of Roman law, this concept has been associated with psychological coercion exercised through the threat of serious and unjust harm. For this reason, the legal system recognizes that consent obtained under intimidation lacks the freedom necessary to produce fully legitimate effects, thereby allowing for the annulment of a contract entered into under moral violence (Zimmermann, 1996).

The basis for this protection lies in the need to preserve genuine freedom of self-determination. Contemporary law requires not only the formal existence of consent but also that the will have been formed without illegitimate pressures capable of significantly reducing the contracting party's decision-making capacity. When a person must choose between accepting certain

conditions or suffering serious harm, consent ceases to represent a genuinely free decision (Perlingieri, 2019).

Contemporary legal doctrine has progressively expanded this classical conception of coercion, recognizing that contractual pressure can also manifest itself through more complex economic or social mechanisms. Thus arose the notion of economic coercion, used to describe cases where one party takes advantage of another's situation of dependence or need to impose excessively disadvantageous contractual conditions (Kennedy, 1982).

Economic coercion occurs particularly in contexts characterized by significant asymmetries of economic, technical, or social power. In these situations, the vulnerable party may find itself practically compelled to accept unfavorable terms due to the absence of real alternatives or the urgent need to access certain goods or services. Although consent formally exists, it is conditioned by circumstances that severely limit freedom of choice (Wilhelmsson, 2004).

A significant legislative advance in this area came with the 2016 reform of the French Civil Code. The new Article 1143 expressly recognizes that violence exists when one party, by abusing the other party's situation of dependence, obtains a commitment that the other party would not have made in the absence of such pressure and also obtains a manifestly excessive advantage. This reform reflects the contemporary trend toward a broader understanding of forms of contractual coercion (Mustapha, 2017).

The incorporation of economic coercion highlights private law's growing concern with addressing material inequalities within contractual relationships. Private autonomy can no longer be conceived as an absolute power detached from ethical and social limits. Therefore, legal protection must extend to all situations where the economic or structural superiority of one party allows it to impose conditions incompatible with true contractual freedom (Micklitz, 2015).

Contemporary Reflections on Fraud in Negotiations, Precontractual Liability, and Preventive Contract Protection

Contemporary developments in contract law demonstrate that abuses of contractual autonomy are not limited solely to cases of violence or economic exploitation, but can also manifest through deception, failure to disclose information, and conduct contrary to good faith during negotiations. Within this context, fraud in negotiations and pre-contractual liability have established themselves as essential mechanisms for protecting transparency and legitimate expectations within contractual relationships (Bianca, 2000).

Contractual fraud consists of any fraudulent conduct intended to induce a person to enter into a contract that they would not have entered into, or would have entered into under different terms, had they known the truth. The law traditionally distinguishes between "determinative fraud," which allows for the annulment of the contract, and "incidental fraud," which preserves the validity of the transaction but gives rise to liability for damages. This distinction reflects the importance that the legal system attaches to the quality of consent and the protection of informed will (Perlingieri, 2019).

The expansion of pre-contractual liability represents one of the most significant transformations in modern private law. Today, contractual negotiations are no longer considered a sphere outside legal control, but rather a phase subject to duties of good faith, disclosure, and fairness derived from the principle of objective good faith. A breach of these duties may give rise to liability even when the contract is not ultimately concluded or remains formally valid.

This development is particularly important in economic contexts characterized by profound information asymmetries, especially in the financial, technology, and real estate sectors. Contemporary legal doctrine holds that whoever possesses relevant information has a duty to disclose essential facts capable of influencing the other party's contractual decision. The deliberate omission of significant information may constitute a pre-contractual tort even in the absence of an express legal obligation to disclose (Mak, 2014).

In this scenario, the so-called exception of pre-contractual tort takes on special importance, understood as a preventive tool that allows the aggrieved party to refuse to perform certain contractual terms established through conduct contrary to good faith. This legal concept reflects a profound transformation in contemporary law: legal protection is no longer limited solely to remedying damages that have already occurred, but rather seeks to prevent , the consolidation of unjust situations arising from contractual abuses (Monzón, 2021).

The pre-contractual unlawfulness defense thus strengthens the ethical role of good faith within contract law. The contract is no longer conceived exclusively as an instrument of economic exchange but also becomes a legal relationship based on duties of cooperation, transparency, and mutual respect. From this perspective, protection against precontractual abuses constitutes a manifestation of the progressive constitutionalization of private law and the growing centrality of principles such as human dignity, substantive equality, and social solidarity within contemporary legal relationships (Rodotà, 2014).

Conclusions

The study of precontractual abuses of contractual autonomy provides insight into the profound transformation undergone by contemporary private law in the face of the real inequalities existing within contractual relationships. The classical conception of the contract based on the presumption of formal equality between the parties and on the sufficiency of consent as the absolute foundation of legitimacy has proven insufficient to address the complex economic and social dynamics that characterize modern legal relationships.

Consequently, developments in legal doctrine and case law have driven the creation of protective mechanisms designed to ensure that private autonomy is exercised under conditions compatible with human dignity, good faith, and substantive justice. Throughout this theoretical analysis, it became evident that contractual autonomy cannot be analyzed exclusively from a formal perspective.

Consent acquires true legal legitimacy only when it arises in contexts where there is genuine freedom of self-determination. The profound economic, informational, and social asymmetries that characterize numerous contemporary contractual relationships demonstrate that contractual intent can be severely constrained by situations of need, dependence, or structural vulnerability. For this reason, contemporary law has begun to actively intervene to limit those exercises of autonomy that produce imbalances incompatible with the constitutional principles of substantive equality and social solidarity. The expansion of mandatory rules and protective nullity constitutes one of the most significant manifestations of this transformation.

Contracts are no longer conceived as a space immune from state control but have become an institution subject to higher principles aimed at protecting the weaker party in the legal relationship. Nullity no longer serves solely as a punitive measure against abstract illegality but also fulfills a corrective and protective function designed to prevent contractual freedom from being used as an instrument of economic exploitation. In this context, the rules governing unfair terms, consumer contracts, financial relationships, and abuse of economic dependence have

taken on particular significance, all of which are aimed at ensuring a minimum balance within private relationships. Likewise, the analysis of contractual justice and termination for injury has demonstrated that contemporary law increasingly recognizes the need to regulate the substantive content of contracts.

The liberal idea that every freely consented contract is necessarily fair has been progressively replaced by conceptions that allow for the judicial review of agreements entered into under conditions of manifest imbalance. Contractual proportionality and equity have ceased to be exceptional criteria and have become relevant parameters within the modern interpretation of private law.

Moral coercion and economic coercion have likewise highlighted the progressive expansion of the forms of protection for contractual freedom. While the classical conception limited coercion to cases of direct threats intended to obtain consent, contemporary doctrinal developments recognize that coercion can also manifest itself through more complex mechanisms of economic pressure or structural dependence. Economic coercion represents one of the most significant developments in this area, as it allows for the identification of situations where one party's economic superiority is abusively used to impose disproportionate contractual conditions on vulnerable parties. This conceptual expansion reflects a more realistic understanding of the power dynamics present in modern contractual relationships.

Similarly, the study of fraudulent misrepresentation and pre-contractual liability has highlighted the growing importance of objective good faith as a structural principle of contemporary contract law. The protection of legitimate expectations and the requirement for transparency during negotiations are essential elements for ensuring that consent is formed in a genuinely free and informed manner.

Current law recognizes that the manipulation of information, material omissions, and unfair conduct during the precontractual stage can seriously undermine the legitimacy of a contract even if it remains formally valid. For this reason, precontractual liability has established itself as an indispensable mechanism for redressing damages arising from conduct contrary to good faith and for strengthening ethical standards within private relationships.

The doctrine of pre-contractual unlawfulness also highlighted the need to develop preventive mechanisms to protect against contractual abuses. Legal protection can no longer be limited solely to remedying damages once they have occurred; rather, it must allow for the prevention of the performance of contracts tainted by unlawful acts capable of causing avoidable harm. The prevention of harm and the protection of good faith justify the recognition of powers designed to neutralize contractual terms obtained through fraud, omission, or undue influence.

In this way, contemporary private law is progressively strengthening mechanisms aimed not only at sanctioning but also at preventing the entrenchment of unjust situations within legal transactions. In general terms, the analysis presented here demonstrates that contemporary contract law is undergoing a process of constitutionalization characterized by the growing influence of principles such as human dignity, social solidarity, substantive equality, and the protection of the individual.

Private autonomy remains one of the essential foundations of civil law, but it can no longer be conceived of as an absolute power detached from ethical and social limits. Contractual freedom is legitimate only when exercised under conditions compatible with mutual respect, transparency, and the prohibition of economic exploitation.

Finally, it can be concluded that pre-contractual abuses of autonomy constitute a central issue in contemporary private law because they reflect the tensions between economic freedom and contractual justice. Developments in legislation and case law demonstrate a clear trend toward the creation of more balanced, " " contractual models capable of recognizing and correcting the real inequalities present within legal relationships.

Consequently, strengthening mechanisms such as protective nullity, pre-contractual liability, economic violence, and preventive guardianship represents a necessary response to the new forms of vulnerability and abuse that have emerged in the context of modern economies.

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Reflections on the University Teaching of Roman Law and the History of Law

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Introduction

The term "teaching of Roman law and history of law" can be understood as an integrated field of historical-legal studies whose epistemological core lies in the Romanist tradition. From this perspective, understanding legal evolution cannot be achieved in a fragmented manner but requires recognition of a historical continuity that links legal institutions from Rome to contemporary systems. In this regard, warnings have long been issued about the risk of presenting legal systems as isolated realities, which leads to a superficial understanding of the legal phenomenon and limits the jurist's interpretive capacity (Díaz, 1994; Stein, 1999).

In the field of legal education, Roman law should not be conceived of as a supplementary subject or as merely historical knowledge, but rather as a structural component of legal knowledge. This position, though debated, is grounded in the need to equip students with tools that enable them to understand the law beyond its normative dimension. Thus, the tension between viewing Roman law as an autonomous discipline or as the foundation of legal history is not merely theoretical; it has direct implications for how law is taught and learned, especially in legal systems of the Romanist tradition (Mousourakis, 2019; Rose, 2002).

In this context, this chapter aims to examine the role of Roman law and historical-legal studies in the training of legal professionals, based on the premise that their teaching contributes significantly to the development of critical, interpretive, and argumentative skills. Implicitly, it is argued that the absence of this training limits the understanding of positive law, while its integration fosters a deeper and more systematic view of the legal system. This approach allows us to address, throughout the chapter, both its theoretical foundations and current methodological challenges, as well as its implications in the Latin American context (Smits, 2012; Gordley, 2013).

Furthermore, the analysis is structured around the idea that the teaching of law cannot be separated from its historical dimension without losing its scientific character. Consequently, the chapter examines how the integration of Roman law into legal education responds not only to an academic tradition but also to an epistemological necessity that enables an understanding of the genesis, evolution, and social function of law. This approach takes on special relevance in a globalized context, where the interaction between legal systems requires a common foundation of understanding (Zimmermann, 1996; Merryman & Pérez-Perdomo, 2007).

In this regard, contemporary literature has emphasized that legal education requires not only the acquisition of normative knowledge but also the development of analytical skills that enable the contextualization of law within broader historical and social processes. This approach strengthens the legal professional's ability to address complex problems in globalized legal environments (Mar, 2010).

One of the main contributions of historical-legal studies lies in their ability to demonstrate that law is neither a static nor an exclusively normative reality, but rather a dynamic phenomenon shaped by social, economic, political, and cultural factors. From this perspective, Roman law takes on significance not only as a historical precursor to contemporary civil law but also as a legal experience that allows us to understand the processes of construction, adaptation, and transformation of legal institutions over time. This historical dimension fosters a more nuanced understanding of law, moving beyond formalist views focused exclusively on the literal wording of the law (Wieacker, 2003; Stein, 1999).

Furthermore, in the contemporary context characterized by legal globalization and the growing interaction between legal systems, the study of Roman law and the history of law allows us to identify common elements that facilitate dialogue among different legal traditions. This is particularly relevant in Latin America, where legal systems have been profoundly influenced by the Romano-Germanic tradition. Consequently, the teaching of legal history not only helps preserve an intellectual heritage but also strengthens the interpretive and comparative skills necessary for contemporary legal practice (Merryman & Pérez-Perdomo, 2007; Smits, 2012).

Similarly, contemporary legal education faces the challenge of balancing the technical teaching of positive law with the development of critical and reflective skills. In this context, historical-legal studies enable students to understand the contingent nature of law and to recognize that legal institutions are shaped by specific historical processes. This approach helps avoid dogmatic conceptions of the legal system and fosters a more flexible and critical understanding of the legal phenomenon (Gordley, 2013; Johnston, 2011).

The Role of Roman Law and Legal History in Legal Education

Roman law stands as one of the most sophisticated legal systems in history, characterized by its internal coherence, its technical development, and its ability to adapt to different social realities. Its influence on contemporary legal systems is not limited to the adoption of institutions but extends to the very way of thinking about law. In this sense, its study allows us to understand not only the content of the rules but also the methods of legal reasoning that remain in force today (Zimmermann, 1996; Stein, 1999).

From an educational perspective, Roman law helps overcome the fragmentation of legal knowledge by providing a structural foundation that connects different branches of law. This integration fosters the development of a systematic perspective, which is indispensable for comparative analysis and the interpretation of legal norms. Within this framework, legal education is strengthened by incorporating historical elements that allow for the contextualization of legal institutions and an understanding of their evolution (Merryman & Pérez-Perdomo, 2007; Gordley, 2013).

Added to this is its impact on the development of legal skills. The precise use of technical language, conceptual understanding, and the ability to argue a case find in Roman law a prime field of training. Legal language, deeply influenced by Latin, not only serves a communicative function but also structures legal thought, allowing for greater precision in the interpretation of legal norms (Mattila, 2006; Tiersma, 1999).

Likewise, Roman law fulfills an axiological function by conveying fundamental values such as equity, good faith, and justice. These principles have not only influenced the evolution of Western law but continue to guide contemporary legal interpretation. In this way, law is understood as a cultural and historical phenomenon, which reinforces the comprehensive education of the jurist (Wieacker, 2003; Stein, 1999).

Understanding law as a holistic phenomenon requires moving beyond reductionist views focused exclusively on the norm, by incorporating axiological and social dimensions. In this regard, the three-dimensional theory of law allows for the articulation of the norm, value, and fact as inseparable elements of the legal phenomenon, which reinforces the importance of a legal education that integrates historical and philosophical perspectives into the analysis of law (Domínguez Vásquez et al., 2024).

Along these lines, recent literature has highlighted that the teaching of Roman law helps students develop metacognitive skills by encouraging reflection on the origin and function of legal institutions. This approach not only improves understanding of positive law but also strengthens the capacity for critical analysis in the face of normative changes (Smits, 2012; Rose, 2002).

Furthermore, the casuistic nature of Roman law promotes problem-based learning, which is particularly useful in contemporary legal education. Through case analysis, students can develop skills in interpretation, argumentation, and conflict resolution, demonstrating the pedagogical relevance of this discipline (Berman, 1983; Gordley, 2013).

Currently, various studies have highlighted that Roman law serves not only a historical function but also a pedagogical one, by facilitating the development of analytical reasoning and legal argumentation skills. This aspect reinforces its relevance in contemporary legal education programs (Johnston, 2011; Mar, 2010).

The enduring presence of Roman law in contemporary legal education can also be explained by its ability to provide stable conceptual categories that continue to be used in modern law. Institutions such as property, obligations, civil liability, and contracts retain conceptual structures whose origins can be traced back to the Roman legal tradition. This phenomenon demonstrates that the Roman legal tradition's influence transcends mere historical reception and extends into the dogmatic construction of contemporary law (Zimmermann, 1996; Johnston, 2011).

From a methodological standpoint, the study of Roman law fosters a rational approach to legal analysis. Roman jurisprudence developed argumentative techniques based on casuistic interpretation and the search for equitable solutions to specific conflicts. These tools remain relevant today, especially in contexts where legal practitioners must address regulatory gaps or resolve complex conflicts through interpretive processes (Gordley, 2013; Berman, 1983).

Furthermore, the teaching of Roman law helps strengthen the ethical training of legal professionals. Reflection on principles such as aequitas, bona fides, and iustitia leads to the understanding that law cannot be reduced to a set of coercive rules but necessarily involves a value-based dimension oriented toward the realization of justice. This ethical dimension is particularly relevant in contemporary contexts marked by institutional crises and questions about the legitimacy of legal systems (Wieacker, 2003; Stein, 1999).

Likewise, a historical analysis of Roman law reveals that legal institutions do not arise in isolation but rather as a response to specific social needs. This understanding fosters a dynamic view of law and strengthens students' ability to critically interpret contemporary legal transformations. Consequently, Roman law continues to play an essential pedagogical role in comprehensive legal education (Smits, 2012; Mar, 2010).

History of Law as the Foundation of Legal Education

The history of law is an indispensable element for understanding the legal phenomenon, insofar as it allows us to analyze its evolution and contextualize its institutions. Without this historical

dimension, legal knowledge tends to be superficial and fragmentary, which limits its explanatory power (Levaggi, 1986; Stein, 1999).

Historical-legal study demonstrates that law is a cultural product in constant transformation, in which many institutions have maintained remarkable continuity since Roman times. This perspective allows us to understand the internal logic of law and its relationship to social, political, and economic changes (Wieacker, 2003; Zimmermann, 1996).

In this sense, legal education is enriched by incorporating a historical dimension that enables the development of sound legal judgment. Knowledge of categories such as obligations, contracts, or inheritance not only facilitates professional practice but also allows for an understanding of the structure of the legal system (Bernal & Ledesma, 2006; Gordley, 2013).

Likewise, historical study allows for the identification of continuities and ruptures in legal institutions, which is essential for understanding processes of normative change in contemporary contexts (Donlan, 2011; Mar, 2010).

Furthermore, historical-legal studies contribute to the development of critical awareness among legal professionals by enabling them to question existing law and reflect on its potential transformation. This critical dimension is essential in contexts where the law must adapt to new social realities (Rose, 2002; Smits, 2012).

Similarly, the history of law provides a comparative framework that allows for the analysis of different legal experiences and an understanding of their similarities and differences. This comparative perspective is essential in a globalized context, where legal systems constantly interact (Merryman & Pérez-Perdomo, 2007; Mattila, 2006). Finally, it can be argued that the history of law serves not only an explanatory function but also an educational one, by contributing to the development of students' analytical and critical thinking skills. Its integration into legal education is therefore indispensable for a well-rounded education (Stein, 1999; Wieacker, 2003).

The history of law also allows us to understand how legal institutions have been used as mechanisms of social organization and control in different historical contexts. This perspective is fundamental for critically analyzing the relationship between law, power, and society, especially in processes of state-building and institutional consolidation. Consequently, historical-legal analysis serves not only a descriptive function but also a critical one, by revealing how specific legal categories correspond to concrete political and economic structures (Wieacker, 2003; Donlan, 2011).

In the Latin American context, this reflection takes on particular relevance due to the coexistence of European legal traditions with deeply heterogeneous social realities. Historical study allows us to identify the tensions arising from the reception of foreign legal models and to analyze their effects on the shaping of national legal systems. In this way, the history of law contributes to developing a critical awareness regarding the processes of legal reception and adaptation in Latin America (Merryman & Pérez-Perdomo, 2007; Santos, 2014).

Likewise, historical-legal knowledge helps strengthen the interpretive skills that are indispensable for professional practice. The ability to contextualize legal norms and understand the evolution of legal institutions enables legal professionals to address complex problems with greater competence, avoiding overly formalistic or decontextualized interpretations of positive law (Gordley, 2013; Johnston, 2011).

Methodological Challenges in Teaching the Discipline

The teaching of Roman law and the history of law currently faces significant challenges stemming from changes in the educational and technological landscape. Among these, the need to justify its relevance in an environment that prioritizes practical and immediate knowledge stands out (Smits, 2012; Rose, 2002).

The widespread expansion of higher education and the shift toward online learning have altered pedagogical dynamics, creating new demands on legal education. In this context, it is necessary to rethink teaching methodologies to ensure meaningful learning (Berman, 1983; Mattila, 2006). In this context, the use of digital technologies in legal education must be accompanied by a critical approach that allows students to evaluate the quality of information and develop intellectual autonomy (Floridi et al., 2018).

The transformation of higher education has also highlighted the need to strengthen teacher training in light of contemporary technological and pedagogical changes. In this context, current trends in higher education emphasize the incorporation of digital tools, virtual learning environments, and artificial intelligence as elements that are redefining the role of the teacher and the dynamics of the teaching-learning process. These transformations call for more flexible, critical, and interdisciplinary pedagogical models, especially in legal disciplines that require the strengthening of analytical and interpretive skills (Duche-Perez et al., 2024).

Furthermore, deficiencies in basic skills such as literacy and critical thinking pose an obstacle to learning complex disciplines such as Roman law. This situation calls for the implementation of innovative pedagogical strategies (Gordley, 2013; Merryman & Pérez-Perdomo, 2007).

In this vein, the teaching of law requires closer integration with legal research, especially at the university level. The training of legal professionals should not be limited to the transmission of content but should be oriented toward the development of research skills that enable students to critically analyze the law and its application in specific contexts. In this regard, the importance of the instructor's role in the construction of legal knowledge has been emphasized, promoting teaching based on reflection and academic production (Martínez Yntriago et al., 2017).

Contemporary legal education also requires strengthening students' research skills as an integral part of the teaching-learning process. From this perspective, university-level legal research should not be limited to specialized academic production but should be incorporated as a pedagogical tool aimed at developing critical analysis, argumentation, and reflection on contemporary legal issues. This approach helps move beyond educational models focused exclusively on the memorization of legal rules and fosters a more reflective and interdisciplinary education.

Likewise, it has been emphasized that the role of the university professor in legal education involves not only conveying content but also guiding processes of knowledge construction that enable students to develop intellectual autonomy and critical thinking skills. Consequently, the integration of teaching and research enhances the quality of legal education and fosters a more dynamic understanding of the law and its social function (Barros, 2024; Cárdenas-Palomino et al., 2024).

The emergence of artificial intelligence introduces new opportunities and risks in legal education. While these tools can facilitate access to information, they also pose challenges in terms of critical thinking and academic rigor (Floridi et al., 2018).

The incorporation of digital technologies into legal education has also transformed the ways in which knowledge is accessed, produced, and disseminated. However, these tools pose significant challenges related to the verification of information, the quality of sources, and the preservation of critical thinking. In this context, instructors must assume a guiding role that enables students to develop criteria for evaluating legal content available in digital environments (Floridi et al., 2018).

Similarly, the gradual reduction of in-person class hours in curricula has forced educators to prioritize essential content and rethink traditional teaching methods. This situation is particularly complex in historical-legal disciplines, where learning requires processes of reflection, contextualization, and conceptual analysis that are difficult to develop through methodologies based exclusively on rote memorization or accelerated learning (Mattila, 2006; Smits, 2012).

Against this backdrop, active learning methodologies take on special relevance. Strategies such as problem-based learning, case analysis, and critical discussion allow students to actively participate in the construction of their knowledge, strengthening interpretive and argumentative skills that are fundamental to contemporary legal education (Freire, 1970; Gordley, 2013).

In this context, the teaching of Roman law should be oriented toward a student-centered model, promoting active student participation and the development of critical thinking skills. This shift implies a transformation in the role of the instructor, who moves from being a transmitter of knowledge to a facilitator (Freire, 1970; Smits, 2012).

Teaching, Learning, and the Development of Critical Legal Thinking in Latin America

The development of Roman law education in Latin America has been shaped by various theoretical approaches. Initially, a positivist perspective predominated, centered on the adoption of European institutions, which limited the development of an independent legal thought (Merryman & Pérez-Perdomo, 2007). Subsequently, approaches emerged that incorporated social and cultural variables, allowing for a broader understanding of law. However, these approaches maintained a predominantly Eurocentric narrative (Wieacker, 2003).

Currently, there is a trend toward critical approaches that seek to situate legal analysis within local contexts. This perspective promotes the development of an autonomous legal framework, in dialogue with tradition but adapted to Latin American realities. This approach involves a renewed emphasis on the social and cultural context in legal education, fostering a more critical legal education that is committed to the Latin American reality (Santos, 2014).

From this perspective, legal education should be oriented toward training critical legal professionals capable of questioning existing law and proposing innovative solutions. This approach entails a transformation in pedagogical practices and in the conception of legal knowledge (Freire, 1970). Likewise, the integration of research into teaching strengthens legal education by promoting a dynamic understanding of knowledge. This process contributes to the development of legal thinking committed to social reality (Santos, 2014; Smits, 2012).

In this context, the teaching of Roman law and the history of law in Latin America faces the challenge of avoiding an uncritical reproduction of legal categories derived from European traditions. This does not imply disregarding the relevance of the Romanist tradition, but rather promoting a contextualized reading that allows for an understanding of how these categories

have been reinterpreted and adapted to Latin American realities. This perspective fosters a more reflective legal education that is linked to regional social issues (Santos, 2014).

The development of critical legal thinking also requires strengthening interdisciplinarity in legal education. Dialogue with disciplines such as history, sociology, philosophy, and political science allows for a broader understanding of the legal phenomenon and helps overcome excessively dogmatic approaches. In this way, students acquire the tools to analyze law as a complex and multidimensional reality (Freire, 1970; Mar, 2010).

Likewise, the integration of teaching and research is a fundamental element in consolidating a critical legal education. Student participation in research processes fosters the development of analytical skills and promotes a reflective attitude toward legal knowledge. In this regard, legal education should be oriented toward training legal professionals capable not only of applying legal norms but also of questioning and transforming them when social conditions so require (Santos, 2014; Smits, 2012).

Conclusions

The analysis presented here supports the assertion that Roman law and the history of law are fundamental pillars of contemporary legal education. Teaching these subjects not only provides technical knowledge but also contributes to the development of critical thinking and an understanding of law as a historical and cultural phenomenon.

Current challenges demand a transformation in teaching methodologies, oriented toward active and meaningful learning. In this context, the integration of critical , and situated approaches is essential for training legal professionals capable of responding to the demands of their environment.

Ultimately, the teaching of Roman law and the history of law must be conceived as a dynamic process, oriented toward the comprehensive training of legal professionals. Its relevance lies not only in its historical value but also in its ability to provide conceptual tools that enable the understanding and transformation of law in the contemporary context. In this sense, the integration of historical, comparative, and critical approaches into legal education enables the training of legal professionals capable of facing the challenges of a globalized environment, thereby contributing to the construction of more reflective and adaptive legal systems.

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Death in Roman Law: Legal and Medical Background and Its Implications for Contemporary Forensic Medicine

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Introduction

Death is a natural and indisputable event until a family member, authority, or court needs to determine what happened, how and when it happened, and what consequences must follow. At that moment, it ceases to be merely the end of a person's life and becomes a legal event: a legal personality comes to an end, inheritance claims arise, obligations regarding the body and the funeral emerge, and civil or criminal liabilities may be triggered. This need to translate a physical event into social and normative language is not unique to current circumstances.

In Roman society, the law intervened to regulate burial sites, limit expenses, protect tombs, and establish who was responsible for certain costs (Hope, 2009; Robinson, 1975), given that death was an integral part of domestic, religious, and public life. The funeral was not a peripheral formality. It allowed for bidding farewell to the deceased, reorganizing the family, and demonstrating with greater or lesser solemnity depending on social status the group's memory and continuity.

It is crucial to study this legacy without automatically applying contemporary categories. Today, forensic medicine has accredited professionals, technologies, resources, clinical protocols, autopsies, civil registries, and validated criteria for determining the cause of death. This did not exist as an integrated system in Rome; although physicians could contribute their knowledge in certain disputes, their involvement was not equivalent to modern expert testimony, and the available evidence does not support the claim that they routinely certified deaths (Amundsen & Ferngren, 1979).

In this context, the historical-legal study of death requires an interdisciplinary approach that integrates contributions from the social, legal, and historical sciences, enabling an understanding of complex phenomena from comprehensive perspectives. Contemporary scientific research emphasizes precisely the importance of developing cross-disciplinary analyses capable of linking different fields of knowledge to interpret social and institutional processes in both their historical and contemporary dimensions (Barros & Bores, 2024). Likewise, recent trends in university education emphasize the need to strengthen critical and interdisciplinary methodologies that foster the production of knowledge that is contextualized and relevant to contemporary challenges (Cárdenas-Palomino et al., 2024). Similarly, continuing education and ongoing professional development in academic and environments contribute to the development of research with higher levels of methodological rigor and interpretive capacity (Quiroz et al., 2025).

For this reason, discussing the "Roman foundations of forensic medicine" requires precision, knowledge, and a meticulous analysis of what the sources of information reveal. The Roman contribution was primarily legal and problem-oriented, given that it made it possible to identify situations in which death had to be proven, adjudicated, or interpreted to produce valid legal effects. The institutionalization of forensic medicine came later and depended on the development of sciences such as anatomy, pathology, autopsy practices, judicial systems, and the scientific authority of physicians gained over time (Wecht, 2005).

The objective of this article is to analyze the concept of death in Roman law, its main implications for funerals, inheritance, and evidence, and to objectively assess its impact on contemporary forensic medicine. The critical question is not whether Rome possessed a form of forensic medicine in the modern sense, but rather what problems it raised and what forms of legal reasoning contributed to the historical construction of the relationship between the body, death, and law that governs contemporary society.

An analytical review of the literature was conducted from a historical-legal perspective. Roman legal sources preserved through modern translations in particular references to the Law of the Twelve Tables, the Institutions, and Justinian's Digest were examined exhaustively and compared with specialized studies on the protection of graves, inheritance, funeral practices, simultaneous deaths, and the involvement of physicians in legal disputes.

The analysis was organized around five fundamental themes: regulations governing the corpse and the funeral; the religious and social significance of death; inheritance consequences; evidentiary uncertainty and medical involvement; and a comparison with contemporary forensic medicine.

Contemporary works on the history of forensic medicine and recent clinical guidelines for determining death based on neurological criteria were incorporated to establish a connection with the present. This research is presented as a narrative and critical review that included some ambiguities, given that Roman sources are fragmentary, were compiled at different times, and must be interpreted within their context; therefore, the authors avoided establishing direct causal relationships between an ancient institution and a current medico-legal practice.

Death as a Social, Religious, and Legal Experience

For the Romans, just as today, dying did not mean immediately disappearing from the community. The deceased remained present in legal records, in family memory, and in rituals and burial sites. Rituals helped separate the living from the dead while maintaining a bond with ancestors. The procession, cremation or burial, eulogy, banquet, and subsequent commemorations served emotional, religious, and political functions (Hope, 2009; Toynbee, 1971).

Death in Roman society should not be described as a uniform experience; behind the solemnity lay notable and profound differences. The elites could turn a funeral into a public display of prestige and family continuity; less privileged individuals depended on charitable institutions such as funeral associations or collective arrangements.

Therefore, access to a dignified burial, a visible grave, and a lasting memory was conditioned by social and economic status, citizenship, and family networks.

Traditional historiography has frequently relied on the idea that the corpse was a general source of religious desecration, viewed as a source of contamination and putrefaction. Recent research has nuanced this interpretation: evidence from the Republican and early Imperial periods does

not allow us to reduce the relationship with the dead to a uniform fear of impurity. Ritual obligations, mourning, spatial separation, and respect for the grave were changing and more complex phenomena (Emmerson, 2020). This correction is important because it avoids presenting as an inescapable fact what remains a subject of academic debate.

From a legal standpoint, death extinguished the individual's physical existence but triggered a network of consequences that fell upon the living. As it was the family's responsibility, they had to organize the funeral; the estate had to find heirs; trusts and bequests required interpretation; and conflicts arising over the body or the grave could give rise to legal actions. Thus, the law did not regulate death in the abstract; rather, it regulated the relationships that death altered.

The Corpse, the Wake, and the Burial

Table X of the Law of the Twelve Tables is one of the most notable examples of regulatory intervention in matters of the dead. Among its provisions were a prohibition against burying or cremating a person within the city and restrictions on certain displays of luxury and mourning. Cicero revisited these rules when reflecting on the civil and religious nature of tombs (Cicero, 1928). Rather than a public health guideline in the modern sense, the regulation addressed urban order, safety, religious tradition, and the control of ostentation.

Thus, over time, burial sites became subject to specific legal protection. Land that was the site of a legitimate burial acquired a special status, and the desecration or disturbance of a grave could trigger legal consequences. Robinson (1975) demonstrated that Roman law developed a complex yet organized set of rules concerning tombs, burial grounds, access, and protection. These regulations reveal that the corpse was not treated merely as a disposable object: although the legal person had ceased to exist, the body, the tomb, and the memory remained subject to protected duties and interests.

An analysis of the economic dimension through the Digest highlights the actions to recover funeral expenses traditionally known as actio funeraria specifying who was responsible for them, particularly the heir or the recipient of the estate's assets. The purpose was not only to reimburse money but also to help ensure that a proper burial could take place even when the succession had not yet been settled (Justinian, 1932, D.11.7; Stanojlović, 2022).

This point retains a recognizable human dimension. When a person dies, the urgency of the funeral often takes precedence over clarity regarding the estate. Rome responded by creating mechanisms to ensure that the duty to bury the deceased would not be paralyzed by subsequent disputes. Contemporary forensic medicine operates in a very different context, but it shares the need to coordinate dignity, identification, documentation, and accountability.

Death, Succession, and Temporal Certainty

One of the most significant legal consequences of death was inheritance. The Roman system offered various ways to arrange the transfer of property, both through a will and in the absence of one. The institution of the heir occupied a central position, while bequests, trusts, and praetorian mechanisms allowed for the refinement of a system that evolved over the centuries (D'Ors, 1997; Johnston, 2015).

The image of an automatic and uniform transfer should, however, be avoided. The acquisition of an inheritance depended on the type of heir and the rules in force during each period. Some heirs were automatically entitled to the inheritance, while others had to accept it; furthermore, accepting the inheritance could mean receiving both assets and debts. Subsequent reforms

introduced instruments to limit risks. This evolution shows that Roman inheritance law was not a static entity, but rather a framework of legal solutions.

Determining the order of deaths took on special importance when two persons entitled to inherit from one another died in the same disaster. The texts of the Digest contain specific presumptions for certain family relationships and ages. There was no simple, universal Roman rule identical to the modern presumption of simultaneous death. These were case-by-case solutions that sought to resolve uncertainty when evidence was insufficient (Schoeman-Malan, 2017).

This point connects directly to contemporary medico-legal logic. In mass accidents, fires, shipwrecks, or disasters, establishing identity, cause, and chronology can alter the distribution of assets, insurance, and liabilities. Today, these questions are addressed through medical records, forensic findings, crime scene analysis, and specific legal rules. Rome did not have these resources, but it recognized that uncertainty regarding the time of death had material consequences and required a legal response.

Violence, Causation, and the Role of Physicians

Roman laws penalized various forms of violence and developed concepts related to intent, fault, harm, and liability. However, directly equating categories such as parricidium, intentional homicide, negligent homicide, and contemporary criminal offenses can be misleading. Roman criminal law evolved from the Republic through the Principate to Late Antiquity, combining public prosecution, private actions, status-based privileges, and religious responses. Only by acknowledging these differences can such a comparison be useful.

The involvement of medical professionals in legal matters must also be analyzed with caution. Various texts refer to medical consultations or assessments in cases involving illness, injury, pregnancy, mental capacity, or bodily harm. However, Amundsen and Ferngren (1979) questioned the idea of an organized body of medical experts comparable to today's. Medical opinion could be relevant, but it was not embedded in an autonomous forensic profession with certified and uniform protocols under licensed monopolies.

Historical prudence requires us to distinguish between plausible human observations and legally formalized procedures, taking into account the absence of an official death certificate which does not literally mean that Roman society was unaware of the need to recognize a death. Family members and close associates examined the body and proceeded in accordance with social practices and rituals. However, attributing to them a standardized list of pathognomonic signs of death such as the absence of a heartbeat, coldness, and rigor mortis as if it constituted a documented Roman protocol goes beyond the documented evidence.

Forensic medicine as an established discipline emerged much later, when judicial authorities began to require more systematic technical reports, and pathological anatomy, autopsy, and toxicology expanded the capacity to explain death. The Roman tradition of * * contributed to the legal language of evidence and liability, but it cannot be considered, on its own, the institutional origin of the specialty (Wecht, 2005).

From Social Recognition to the Clinical and Legal Determination of Death

Currently, the determination of death is based on legal norms and medical standards. It can be established using various medical criteria, depending on the applicable legislation and the context in question. Contemporary guidelines for death based on neurological criteria require

prerequisites, rigorous clinical evaluation, the exclusion of confounding factors, and supplementary tests only when warranted (Greer et al., 2023).

Modern medicine is capable of artificially sustaining life for extended periods, which has necessitated a redefinition of the relationship between biological function, irreversibility, and a person's death. There are also multiple protocols, registration systems, certificates, medico-legal autopsies, chains of custody, and scientific identification. Contemporary certainty does not depend exclusively on someone observing a body, but rather on a combination of professional expertise, protocols, documents, and institutional controls making the difference from ancient Rome substantial when compared

Despite these contrasts, an intellectual continuity remains: death must be recognized in such a way that society can act. The clinical diagnosis authorizes the suspension of medical interventions; the death certificate enables registration; the autopsy can clarify responsibilities; and the official record facilitates probate proceedings. Medical-legal certainty functions as a bridge between bodily reality and the legal order.

We must not forget that this bridge is also traversed by values. Respect for the body, communication with family members, the proportionality of interventions, confidentiality, and transparency are ethical dimensions inseparable from the technical aspects. The Roman experience reminds us that death always occurs within a community of meanings; contemporary forensic medicine adds the obligation that these meanings be grounded in evidence, rights, and verifiable procedures.

Comparative Summary

Table 1. *Critical Comparison of Roman Issues and Contemporary Forensic Medical Practices*

Dimension	Roman Law	Contemporary Forensic Medicine	Critical Analysis
Determination of death	Social and legal recognition without a documented uniform clinical protocol.	Circulatory or neurological criteria, competent professionals, and official documentation.	There is continuity in the need for certainty, not technical equivalence.
Medical Involvement	Medical opinions in certain disputes; a variable and non-institutionalized role.	Regulated expert testimony, certification, autopsy, toxicology, and scientific identification.	The Roman physician should not present himself as a modern medical examiner.
Corpse and Burial	Funeral obligations, the legal status of the grave, and actions to be taken in the event of its disturbance.	Health, criminal, civil, and bioethical protection of the body and human remains.	Both systems recognize postmortem interests, albeit on different grounds.
Funeral expenses	Action to recover expenses from the party responsible for paying them, linked to the estate.	Financial liability governed by civil, probate, and administrative laws.	Continuity is legal and functional, not necessarily linear.

Succession	Death triggers the application of testamentary or intestate rules and may require acceptance by the heir.	The death certificate and succession laws allow for the transfer of rights and obligations.	Death retains its role as a legal triggering event.
Simultaneous Deaths	Case-by-case presumptions in certain family situations.	Forensic evidence and legal rules regarding survival or simultaneity, depending on the jurisdiction.	There was no single universal Roman rule regarding commorientes.
Violence and Liability	Changing historical categories regarding harm, intent, and punishment.	Criminal classification, medico-legal causation, and procedural safeguards.	General similarities do not justify identifying ancient and modern categories.

Source: Author's own work (2026)

Rome bequeathed forms of judgment, legal categories, and mechanisms for managing the consequences of death. Forensic medicine, on the other hand, later contributed a set of scientific methods and procedures to answer questions that the law already considered relevant: identity, causality, chronology, liability, and documentary validity. This analysis supports the claim that the Roman influence on contemporary forensic medicine is real and demonstrable, yet indirect.

The initial version of the argument that Roman practices directly anticipated medical certification and the identification of corpses needs to be qualified. Ancestral masks, for example, belonged to the realm of memory, status, and family representation; they were not a forensic identification procedure. Similarly, the occasional presence of physicians in controversial death cases does not prove the existence of routine certification of death.

The most fruitful contribution of Roman law lies in demonstrating that death was never merely a natural fact. For a community to be able to bury, inherit, impose penalties, or commemorate, death must take on a legal form. Today, that form is constructed through collaboration among medicine, law, civil registration, forensic science, and bioethics. This interdisciplinary approach is not an academic embellishment, but rather the condition for certainty regarding death to be technically reliable and humanly legitimate.

From a contemporary historiographical perspective, the relationship between Roman law and forensic medicine must be understood as a process of gradual knowledge construction rather than as a direct institutional continuity. The consolidation of forensic medicine was linked to scientific, cultural, and legal transformations that fostered the development of technical procedures aimed at determining death, identifying individuals, and producing expert evidence. In this sense, the Roman legacy lies less in the existence of formalized medico-forensic mechanisms and more in the early formulation of legal problems related to evidence, liability, and legal certainty issues that remain central to contemporary legal systems.

The specialized literature has noted that modern forensic medicine emerged in close connection with the strengthening of judicial systems, the progressive professionalization of medical practice, and the incorporation of increasingly precise scientific methodologies for determining the causes of death (Madea, 2005). Similarly, various studies have emphasized that the certification of death and the diagnostic criteria for death are historical constructs subject to ongoing revision as a result of technological advances, social transformations, and contemporary

bioethical debates (Bernat, 2013). This perspective allows us to recognize that, although procedures have changed significantly, the need to confer legal certainty on death has remained a historical constant.

Furthermore, comparative analysis reveals that death continues to be a phenomenon in which biological, legal, social, cultural, and ethical dimensions converge. Current debates on brain death, withdrawal of life-sustaining treatment, informed consent, organ donation, and postmortem rights demonstrate that questions similar to those raised by ancient societies regarding the social recognition of death and its consequences for the community persist (Greer et al., 2023). Consequently, the study of Roman law not only allows us to reconstruct historical precedents but also to understand the mechanisms through which different societies have sought to transform a biological fact into a legally valid, socially recognized, and culturally significant reality.

There are also limitations to this review. Ancient documentation is incomplete; many rules are known through later texts that compiled materials from different eras; and practices varied across territories and social groups. Furthermore, the comparison with modern forensic medicine cannot encompass all legal systems. Regulations regarding certification, autopsies, organ donation, and death based on neurological criteria differ from country to country. Therefore, the conclusions should be understood as a general historical interpretation rather than an exhaustive genealogy.

Ultimately, the value of this analysis lies in demonstrating that societies have had to construct mechanisms of legitimation to confer legal significance on death and regulate its consequences. While in Rome this was expressed through funeral regulations, inheritance institutions, and case-by-case solutions to evidentiary uncertainty, today it manifests itself through clinical standards, expert procedures, scientific protocols, and procedural safeguards. Historical continuity, therefore, does not lie in the identity of the institutions, but in the persistence of the human and legal need to transform biological death into a socially accepted, legally recognized, and operationally effective certainty.

Conclusion

The conclusions allow us to affirm that, in Roman law, death constituted an event of profound social and legal significance, the occurrence of which entailed a reorganization of family, property, and community relationships. Beyond marking the end of biological existence, death generated specific legal effects related to succession, the preservation of assets, the fulfillment of family obligations, and the respect due to the body and to burial sites.

Likewise, the regulation of burial sites, provisions regarding funeral practices, the *actio funeraria*, institutions of succession, and legal solutions developed to address situations of uncertain death constitute highly relevant precedents for understanding issues that continue to be the subject of study and debate both in the legal field and in contemporary forensic sciences. These provisions demonstrate a historical concern for providing legal certainty regarding the consequences of death and for ensuring mechanisms to resolve conflicts related to the determination and recognition of death.

However, it is necessary to avoid anachronistic interpretations that seek to equate Roman practices with current medico-legal institutions. The figure of the Roman physician cannot be conceived of as an official expert in the modern sense, nor can funeral rituals be interpreted as clinical protocols for certifying death, since there is insufficient historical evidence to affirm the

existence of an institutionalized forensic medicine or procedures equivalent to contemporary systems for the medical determination of death.

In this context, the main continuity between the Roman world and modern societies lies in the need to transform biological death into a socially recognized, legally validated reality capable of producing specific legal effects. However, while in Rome this recognition was based on customs, religious practices, and legal norms specific to that era, today this process requires the application of scientific methods, the involvement of specialized professionals, the issuance of official documentation, compliance with procedural safeguards, and adherence to bioethical principles that ensure respect for human dignity.

Finally, a critical analysis of these historical roots contributes to the strengthening of Legal Medicine and Forensic Sciences by reminding us that any determination related to death transcends the strictly technical realm. Every diagnosis, certificate, expert report, or autopsy performed has direct repercussions on specific individuals, families seeking answers, communities preserving the memory of their members, and legal systems that bear the responsibility to act with justice, scientific rigor, human sensitivity, and respect for the dignity of those who have died and those who remain connected to them.

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The Influence of Roman Law on Contemporary Jurisprudence and in Ecuador

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Introduction

Roman law constitutes one of the fundamental pillars of the Western legal tradition and represents the historical foundation upon which a large part of contemporary legal systems were built. Roman law is understood to be the set of legal institutions, principles, and norms that governed Roman society from its founding in 753 B.C. until the fall of the Western Roman Empire in the 5th century A.D., with its validity extending into the Eastern Roman Empire until 1453. Its definitive systematization took place during the reign of Emperor Justinian I through the compilation of the Corpus Iuris Civilis, a work that constitutes one of humanity's most important legal legacies and has exerted a decisive influence on European and Latin American civil legal systems.

The historical significance of Roman law lies not only in its value as a normative precedent but also in its ability to provide conceptual categories, interpretive principles, and methods of legal reasoning that continue to guide contemporary doctrinal, legislative, and jurisprudential work (Stein, 1999; Zimmermann, 1996). Indeed, institutions such as property, obligations, inheritance, civil liability, contractual good faith, and the presumption of innocence have their roots in concepts developed by classical Roman jurisprudence.

In the current context of higher education, the study of Roman law remains fully relevant due to its contribution to the comprehensive training of legal professionals. Contemporary legal education demands approaches capable of combining the dogmatic tradition with a critical analysis of social and normative transformations, fostering interdisciplinary research and historical reflection on legal institutions (Barros & Bores, 2024). From this perspective, university education cannot be limited to technical knowledge of positive law but must incorporate methodological tools that enable an understanding of the historical evolution of legal categories and their impact on current legal systems (Cárdenas-Palomino et al., 2024).

Likewise, contemporary legal research has highlighted the need to strengthen academic updating and continuing education processes that enable the construction of contextualized scientific knowledge geared toward responding to the new demands of globalized societies (Quiroz et al., 2025). In this context, Roman law remains a strategic discipline for the development of legal thought, as it provides models of systematic interpretation, analogical reasoning, and casuistic argumentation that are still present in modern judicial practice.

To properly understand the relevance of Roman law, it is essential to examine some of its key features. Among these is the gradual separation between ius and fas a distinction that allowed for the demarcation of the legal sphere from the religious one and facilitated the emergence of categories such as ius civile, ius gentium, and ius naturale, many of which have endured to this day. Similarly, the development of a true legal science through the work of jurists such as Gaius, Ulpian, Paulus, and Papinian consolidated a rational method of legal interpretation that decisively influenced the construction of modern codified legal systems.

In Latin America, and particularly in Ecuador, the reception of Roman law initially occurred through the Spanish legal tradition and later through the influence of Andrés Bello's Chilean Civil

Code, whose content bears a marked Romanist imprint. Consequently, the study of the influence of Roman law on contemporary jurisprudence and the Ecuadorian legal system allows us to understand not only the historical continuity of certain legal institutions but also the enduring nature of universal principles that continue to guide the administration of justice, judicial interpretation, and the training of legal professionals.

This research adopts a qualitative approach, grounded in a descriptive, historical-legal, analytical, and comparative methodology. The study draws on a doctrinal review of primary sources of Roman law, particularly Justinian's *Corpus Iuris Civilis*, Gaius's *Institutions*, and the *Digest*, as well as the works of the leading classical jurists, including Ulpian, Papinian, and Paulus. Likewise, contemporary secondary sources from modern Roman law scholarship and specialized studies on legal reception and the civil law tradition are analyzed.

From a historical-comparative perspective, a comparison is made between Roman legal institutions and the current Ecuadorian legal system, particularly the Ecuadorian Civil Code, the 2008 Constitution of the Republic of Ecuador, and the Comprehensive Organic Criminal Code. This comparative exercise allows us to identify the persistence of Roman legal categories in contemporary legislation, as well as to demonstrate the historical continuity of certain principles that continue to shape modern legal thought.

The dogmatic-legal method allows for an examination of the conceptual scope of institutions such as property, obligations, civil liability, inheritance, parental authority, and the presumption of innocence, establishing their origins in Roman law and observing their evolution within legal systems of the civil law tradition. In this regard, the research is based on the assumption that Roman law constitutes not only a historical precursor to current positive law but also a methodological tool for legal interpretation and argumentation (Zimmermann, 1996; Stein, 1999).

Furthermore, a systematic bibliographic analysis based on recent scholarly literature is employed, given the importance of legal research in the construction of knowledge within contemporary social sciences. In this context, various studies have highlighted that strengthening research competencies in the university setting fosters a critical understanding of the historical processes and normative transformations that shape current legal systems (Barros & Bores, 2024; Cárdenas-Palomino et al., 2024; Quiroz et al., 2025).

Fundamental Characteristics of Roman Law

Roman law constitutes one of the most influential legal systems in human history and represents the foundation upon which numerous modern legal systems were built, especially those belonging to the Romano-Germanic tradition. Its significance lies not only in the antiquity of its institutions but also in the extraordinary ability of its jurists to systematize legal principles of universal application.

One of its essential characteristics was its customary origin. In its early stages, Roman law developed from ancestral customs (mos maiorum), which were considered legitimate expressions of the collective will and the accumulated experience of the Roman community. Subsequently, these practices were codified through the enactment of the Law of the Twelve Tables, considered the first major compilation of Roman private law and the starting point for the subsequent evolution of Western legal scholarship (Stein, 1999).

Another distinctive feature of Roman law was its profoundly rational and systematic nature. Unlike other ancient legal systems, Roman jurists developed a genuine scientific methodology

for the analysis of law. Figures such as Gaius, Ulpian, and Papinian formulated interpretive criteria based on logic, analogy, and equity, laying the foundations for modern legal doctrine (Schulz, 1951).

Of particular significance was the three-part classification of law proposed by classical jurisprudence:

- Ius civile, applicable exclusively to Roman citizens;
- Ius gentium, conceived as a set of principles common to various peoples;
- Ius naturale, understood as the law derived from reason and in accordance with human nature.

This conceptual division exerted a decisive influence on the subsequent differentiation between public law and private law, and even on the progressive development of modern international law (Stein, 1999).

Roman law also developed legal categories that remain in force today. Institutions such as property (dominium), possession (possessio), obligations (obligationes), contracts (contractus), inheritance (successio), and civil liability constitute essential pillars of contemporary civil law. Its reception occurred initially through Justinian's *Corpus Iuris Civilis* and subsequently through the major European codifications of the nineteenth century, particularly the Napoleonic Code of 1804 and the German *Bürgerliches Gesetzbuch* of 1900 (Zimmermann, 1996).

The importance of Roman law extends beyond the strictly normative sphere. Its study continues to be regarded as a fundamental tool for legal education because it fosters the development of critical thinking, the systematic interpretation of legal rules, and the argumentative skills of the contemporary jurist. Consequently, it continues to occupy a central place in university-level legal education in Europe and Latin America, especially within those legal traditions influenced by the continental civil law model (Domingo, 2018).

Characteristics of Roman Law and Its Impact on Contemporary Legal Systems

Roman law constitutes one of the most influential legal systems in the Western tradition and represents the historical foundation upon which numerous contemporary legal systems were built, especially those belonging to the Romano- r Germanic legal families. Its evolution from a set of customary practices into a highly systematized legal science enabled the development of dogmatic categories that remain in force today (Stein, 1999; Tellegen-Couperus, 1993).

From a historical perspective, Roman law had an eminently customary origin, initially grounded in the mos maiorum, understood as the set of customs inherited from ancestors and considered binding on the community. Subsequently, these practices were codified through the enactment of written laws, most notably the Law of the Twelve Tables, considered the first Roman legislative body and the starting point for the development of Western private law (Crook, 1967).

One of the most significant features of the Roman legal system was the gradual differentiation between ius and fas, a distinction that made it possible to separate the legal sphere from the religious one and to consolidate a rational conception of law based on autonomous normative principles. This process fostered the emergence of various branches of law, including ius civile, ius gentium, and ius naturale categories that would later influence the development of contemporary public, private, and international law.

The methodological importance of Roman law also lies in its conception of law as a true science. Roman iuris prudentia was characterized by the systematic study of specific cases, analogical reasoning, and the development of legal doctrine by jurists of extraordinary significance, among whom Gaius, Ulpian, Paulus, and Papinian stand out. Their interpretive work went beyond the mere application of legal rules and gave rise to a body of case law that formed the intellectual foundation of European legal thought (Johnston, 1999).

In this context, the compilation ordered by Emperor Justinian I during the 6th century A.D., known as the Corpus Iuris Civilis, represents one of the most significant milestones in the history of universal law. Comprising the Codex, the Digest, the Institutes, and the Novellae Constitutiones, this body of law preserved the classical legal tradition and served as the foundation for the process of reception of Roman law in continental Europe beginning in the 12th century (Stein, 1999).

The legal systematization developed by Rome also made it possible to establish important classifications of law that remain valid in contemporary legal scholarship. Among these, the distinction stands out between ius civile, applicable exclusively to Roman citizens; ius gentium, intended to regulate relations between Romans and foreigners; and ius naturale, conceived as a set of principles derived from reason and common to all humanity. These categories have significantly influenced the subsequent development of modern notions of fundamental rights, universal justice, and international law.

Likewise, Roman law developed essential legal institutions that still constitute pillars of modern civil law systems. Concepts such as property, possession, obligation, contract, civil liability, succession, bequest, and estate have a clear Roman origin and continue to shape contemporary legal regulation (Zimmermann, 1996). Legal scholars recognize that one of the most significant contributions of Roman law was the formulation of general principles of law that remain fully relevant today. Among these are the well-known precepts attributed to Ulpian:

- Honeste vivere (to live honestly);
- Alterum non laedere (do no harm to another);
- Suum cuique tribuere (give to each his due).

These principles constitute true axiological guidelines that direct both state and private conduct, in addition to serving as interpretive criteria for the resolution of complex legal conflicts (Schulz, 1951).

The historical significance of Roman law is also explained by its ability to adapt to new social and economic realities. Its influence was decisive in the drafting of the major European civil codes, particularly the Code Napoléon of 1804, the German Bürgerliches Gesetzbuch (BGB) of 1900, and the Chilean Civil Code by Andrés Bello a document that would later serve as a model for various Latin American codifications, including the Ecuadorian Civil Code (Zimmermann, 1996).

Roman Law as the Foundation of Modern Legal Science

Roman law is not merely a legal system belonging to the West's historical past; rather, it represents one of the fundamental pillars upon which modern legal science was built. The Roman legal tradition facilitated the transition from customary forms of social regulation to a rationally structured legal system based on principles, dogmatic categories, and interpretive techniques that continue to be employed by contemporary legal practitioners (Stein, 1999).

The consolidation of Roman iuris prudentia transformed law into a true scientific discipline. Roman jurists did not limit themselves to mechanically applying positive norms; rather, they developed a methodology of legal analysis grounded in systematic interpretation, rational argumentation, and the casuistic resolution of disputes. This conception of law as a practical science constitutes one of Rome's most significant contributions to universal legal thought (Johnston, 1999).

In this context, Gaius, Ulpian, Paulus, and Papinian played an essential role in the doctrinal development of private law, establishing legal institutions whose influence remains evident today. The classification of obligations, the general theory of contracts, the concept of property, legal actions, and the systematization of the sources of law constitute legal constructs that transcended the Roman sphere to become universal categories of continental European and Latin American law (Du Plessis, 2020).

Various contemporary studies have emphasized that the significance of Roman law lies not exclusively in the content of its institutions, but also in the legal method developed by its jurists. The use of analogical reasoning, interpretation in accordance with principles of equity, and the ability to adapt legal solutions to new social realities are elements that explain the continued relevance of the Roman legal tradition in today's legal systems (Borkowski & Du Plessis, 2020).

The Corpus Iuris Civilis, compiled under the reign of Emperor Justinian in the 6th century A.D., represents the highest expression of this legal tradition. This compilation, consisting of the Codex, the Digest, the Institutiones, and the Novellae Constitutiones, preserved classical legal thought and facilitated its reception during the Middle Ages and the Early Modern period, particularly through the School of Bologna, whose systematic study spurred the phenomenon known as the reception of Roman law in Europe (Stein, 1999).

The influence of Roman law on the formation of the major European civil codes is particularly significant. Both the French Code Civil of 1804 and the German Bürgerliches Gesetzbuch of 1900 incorporated principles and categories derived from the Roman " " tradition, albeit adapted to the political and social needs of their respective historical contexts. Subsequently, these models were introduced into Latin America through national codification processes that had a particularly significant impact in countries such as Chile, Argentina, Colombia, and Ecuador (Zimmermann, 1996).

Consequently, the view of Roman law as a true legal science is grounded in this legal system's ability to construct abstract concepts, establish general principles, and develop interpretive techniques that continue to guide contemporary judicial practice. As Zimmermann (1996) points out, the enduring legacy of Roman law demonstrates that law is not merely a set of positive norms, but also an intellectual tradition designed to provide rational solutions to the problems arising from social coexistence.

Furthermore, the study of Roman law retains an essential pedagogical role in the training of legal professionals. Its analysis allows for the development of skills related to legal argumentation, logical reasoning, statutory interpretation, and a historical understanding of legal institutions aspects considered indispensable for addressing the challenges arising from contemporary legal complexity (Barros & Bores, 2024; Cárdenas-Palomino et al., 2024).

From a contemporary academic perspective, the teaching of Roman law also contributes to strengthening comparative legal research, enabling an understanding of the historical evolution of legal institutions and facilitating the identification of common elements among different legal systems. This research dimension takes on special relevance in the Latin American university

context, where legal education seeks to integrate historical tradition, scientific innovation, and social commitment (Quiroz, et al., 2025).

Roman Law as a Legal Science and Its Influence on Contemporary Jurisprudence

One of Roman law's most significant contributions to universal legal thought lies in the consolidation of iuris prudentia as a true science of law. In Rome, law was not conceived solely as a set of coercive rules, but as a rational system open to interpretation, doctrinal development, and case-by-case application. The iurisconsulti played an essential role in Roman legal evolution, as their opinions, responses, and commentaries helped structure dogmatic categories that still underpin numerous legal systems of the civil law tradition today (Stein, 1999).

Roman jurisprudence was characterized by its ability to adapt to the social, economic, and political transformations of the Empire, developing legal solutions based on equity, reasonableness, and practical experience. This methodology allowed Roman law to transcend its historical context and influence subsequent legal systems, becoming a central element of the Western legal tradition (Zimmermann, 1996).

In this sense, it can be said that Roman law established a genuine methodology of legal reasoning based on the resolution of specific cases, anticipating what is now known as the jurisprudential method or analogical reasoning. This explains why numerous contemporary studies consider the Roman experience to remain an indispensable tool for the training of jurists, particularly in those countries that adhere to the Romano-Germanic system (Du Plessis, et al., 2016).

Roman jurists did not limit themselves to interpreting the rules literally but sought to discover the most appropriate solution based on general principles of law, custom, and substantive justice. This characteristic constitutes one of Roman law's greatest contributions to contemporary legal interpretation theory, as it made it possible to move beyond excessively formalistic approaches by incorporating criteria of prudence and rationality (Johnston, 1999).

Similarly, the Roman legal tradition established a scientific conception of law based on the systematic classification of legal institutions. The distinction between ius civile, ius gentium, and ius naturale made it possible to construct conceptual categories that later influenced the formation of the modern division between public law, private law, and international law.

The importance of this legacy is clearly evident in contemporary case law. Numerous constitutional courts and supreme courts frequently draw upon principles derived from Roman law to support decisions regarding the protection of property, contractual good faith, civil liability, the interpretation of obligations, and the protection of fundamental rights. The enduring relevance of these concepts demonstrates the extraordinary adaptability of the Roman legal legacy to the normative needs of contemporary societies (Mousourakis, 2015).

Consequently, Roman law must be understood not merely as a historical discipline, but as a permanent source of principles, dogmatic categories, and interpretive methods that continue to guide contemporary judicial activity and enrich the academic debate on the evolution of law in today's democratic societies.

Roman Law in Ecuador: Historical Continuity and Legal Reception

The influence of Roman law in Ecuador constitutes one of the most representative phenomena of historical continuity within the continental legal tradition. Its reception did not occur directly from classical legal tradition but through a complex process of transmission that included the medieval reception of the Corpus Iuris Civilis, the Castilian legal tradition, Indian law, and subsequently the 19th-century Latin American codification, particularly through the work of Andrés Bello (Guzmán Brito, 2000; Petit, 2007).

In this sense, the Ecuadorian legal system unequivocally belongs to the Romano-Germanic family, whose conceptual foundations rest on institutions developed by classical Roman jurisprudence, such as property, obligations, contracts, succession, possession, and civil liability (Zimmermann, 1996). The significance of this legal heritage has been widely recognized by contemporary legal scholarship, which holds that Roman law continues to provide indispensable dogmatic categories for the systematic interpretation of current law (Schipani, 2019).

The process of the reception of Roman law in Ecuador can be understood through three fundamental historical stages. The first corresponds to the colonial era, during which Castilian law and the Indian compilations incorporated numerous " " elements derived from the European ius commune, which was deeply influenced by the Romanistic tradition. The second stage relates to political independence and the consolidation of Latin American states, a time when the need arose to build national legal systems inspired by European codified models. Finally, the third stage is linked to the adoption of Andrés Bello's Civil Code, whose influence in Ecuador was decisive in shaping contemporary private law.

Various specialized studies have highlighted that the Ecuadorian Civil Code largely reproduces the conceptual structure of the 1855 Chilean Civil Code, drafted by Andrés Bello, who drew primarily on Justinian Roman law, the Castilian Seven Partidas, canon law, and 19th-century European Romanist doctrine. Consequently, numerous provisions currently in force preserve legal institutions whose original formulation can be traced back to Roman sources.

Among the most relevant examples is the regulation of private property, conceived in Rome as a full and exclusive right over a thing (dominium ex iure Quiritium). Modern legal scholarship recognizes that the current configuration of the right of ownership in civil law systems maintains a clear continuity with the Roman conception of absolute property, albeit adapted to the limitations arising from contemporary social and environmental considerations (Schulz, 1951; Zimmermann, 1996).

Likewise, the classification of the sources of obligations contained in Article 1453 of the Ecuadorian Civil Code preserves the traditional Roman systematization developed by Gaius and later refined by Justinian, distinguishing between contracts, quasi-contracts, torts, quasi-torts, and the law as sources that give rise to obligations. This doctrinal framework has exerted a significant influence on the general theory of obligations in Latin America (Petit, 2007).

Another area where Roman legal influence is evident is the law of succession. Institutions such as the bequest, inheritance, acceptance of an inheritance, representation, and partition of the estate have their direct origins in the Roman system of inheritance, particularly in the provisions contained in Book II of the Justinian Institutes (Kaser, 1982).

Similarly, the distinction between public law and private law traditionally attributed to Ulpian continues to be one of the essential methodological criteria for the teaching and understanding of Ecuadorian law. The famous assertion that public law concerns the organization of the state

and private law concerns the interests of individuals remains fully valid in contemporary legal doctrine (Domingo, 2018).

In the constitutional and criminal spheres, the influence of Roman legal thought can also be identified in fundamental principles such as the presumption of innocence, good faith, equity, proportionality, and the effective protection of rights. Although these categories have been reformulated based on contemporary developments in constitutionalism and international human rights law, their historical foundation largely stems from the Roman legal tradition.

From the perspective of legal education, the study of Roman law continues to play an essential formative role in Ecuadorian law schools, not only because of its historical value but also because of its contribution to the development of legal reasoning, dogmatic argumentation, and the analytical skills necessary to interpret complex legal systems (Barros & Bores, 2024; Cárdenas-Palomino et al., 2024; Quiroz et al., 2025). Consequently, Roman law studies remain an indispensable pedagogical tool for understanding the historical evolution of law and strengthening the comprehensive training of future legal professionals.

The Enduring Presence of Roman Law in Ecuadorian Legal Culture: A Contemporary Perspective

The persistence of Roman law in the Ecuadorian legal system transcends the mere preservation of historical institutions and constitutes a manifestation of dogmatic, methodological, and axiological continuity within the continental legal tradition. Its legacy is not limited to having served as a precursor to modern codifications; rather, it continues to influence statutory interpretation, judicial activity, and the academic training of legal professionals (Zimmermann, 1996).

Roman legal practice developed conceptual categories that remain fully relevant in the regulation of private relationships, particularly in matters related to property, obligations, contracts, inheritance, and civil liability. Institutions such as possession, ownership, good faith, legal transactions, and the classification of sources of obligations have demonstrated a remarkable capacity to adapt to contemporary social, economic, and constitutional transformations (Kaser, 1982).

In the Ecuadorian context, this influence is particularly evident in the Civil Code, whose normative structure derives from the Chilean Civil Code drafted by Andrés Bello and, consequently, maintains a close connection to the legal constructs developed by classical Roman jurisprudence (Guzmán Brito, 2000). Similarly, fundamental legal principles such as the presumption of innocence, good faith, equity, and the distinction between public law and private law find part of their historical foundations in the Roman legal tradition.

The significance of Roman law also lies in its methodological contribution. Roman iuris prudentia was conceived as a true science of law, grounded in prudence, experience, and the case-by-case analysis of legal disputes. Roman jurists developed argumentative techniques aimed at finding fair and reasonable solutions to the concrete problems of social life, establishing a model of legal reasoning that continues to be used in contemporary judicial practice (Stein, 1999).

Indeed, principle-based reasoning, the systematic interpretation of legal norms, legal analogy, and the assessment of the particular circumstances of each case represent methodological elements inherited from the Roman tradition that continue to play a significant role in Ecuadorian

judicial practice. The creative function of case law understood as an instrument for adapting the law to new social realities also finds important precedents in the classical legal tradition.

Furthermore, the study of Roman law retains a significant formative role within university legal education. Beyond its historical dimension, it helps strengthen the analytical, argumentative, and hermeneutic skills that are indispensable for contemporary professional practice. In this regard, various recent studies highlight the need to promote educational models geared toward the consolidation of research skills, critical thinking, and interdisciplinary training aspects in which the study of Roman law continues to offer significant pedagogical contributions (Barros & Bores, 2024; Cárdenas-Palomino et al., 2024; Quiroz et al., 2025).

From this perspective, Roman law should be understood not merely as a subject of historical study, but as a system of legal thought whose influence remains present in doctrinal development, judicial interpretation, and the evolution of Ecuadorian legal institutions. The continued relevance of its principles demonstrates the capacity of Roman thought to transcend specific historical contexts and serve as a permanent reference point for the search for legal solutions that are coherent, equitable, and compatible with the demands of the contemporary constitutional state.

Conclusion

Roman law constitutes one of the fundamental pillars upon which the Western legal tradition was built and continues to exert a significant influence on contemporary legal systems. Its legacy is not limited to the transmission of specific legal institutions but encompasses a methodology of reasoning, interpretation, and legal systematization that has enabled the constant evolution of legal systems in the civil law tradition. The analysis conducted shows that numerous legal categories currently in force such as property, obligations, contracts, civil liability, inheritance, legal capacity, and the presumption of innocence have their direct origins in the Roman legal tradition. The enduring nature of these institutions demonstrates Roman law's extraordinary ability to adapt to different historical, social, and cultural contexts.

Likewise, it is observed that Roman jurisprudence developed a model of legal thinking based on prudence, casuistry, and the search for equitable solutions to specific situations elements that remain present in contemporary judicial practice. The creative role played by Roman jurists foreshadowed modern forms of doctrinal and jurisprudential development, becoming a benchmark for the dynamic interpretation of law. In the case of Ecuador, the influence of Roman law is particularly evident in the Civil Code, whose structure reflects the Romanist tradition transmitted through Spanish law, the Chilean Civil Code by Andrés Bello, and French codification. Institutions such as parental authority, emancipation, the sources of obligations, the succession regime, and property law retain a clear connection to the categories developed by Roman jurists. Likewise, universal principles formulated in Rome such as *honeste vivere*, *alterum non laedere*, and *suum cuique tribuere* continue to guide the development of legal systems grounded in justice, human dignity, and the protection of fundamental rights. Their enduring relevance demonstrates that Roman law transcends its historical dimension to become an instrument for understanding and refining current law. Finally, the study of Roman law retains indisputable academic and professional relevance. Teaching it not only facilitates an understanding of the historical foundations of the Ecuadorian legal system but also contributes to strengthening critical thinking, legal reasoning, and the comprehensive training of future legal practitioners. Consequently, preserving its presence in legal education represents a scientific and educational necessity that fosters the consolidation of a legal culture grounded in the principles of rationality, equity, and legal certainty.

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Reflections on Political Violence and Business Activity from a Diachronic Perspective

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Introduction

The issue of political violence and so-called environmental violence constitutes one of the most complex debates surrounding the theory of defects in consent, both in contemporary private law and in the Romanistic legal tradition. Italian civil law doctrine has highlighted the difficulties involved in classifying these manifestations of coercion within the traditional categories of moral violence provided for by the legal system, particularly in relation to Article 1434 of the Italian Civil Code, which recognizes the voidability of a contract even when the violence stems from a third party other than the counterparty and without the counterparty's knowledge (Mazzarese, 1974).

Currently, legal research is taking place in increasingly interdisciplinary settings, in which the historical analysis of law takes on renewed importance for understanding the evolution of private institutions and their protective mechanisms. In this regard, the strengthening of scientific research in the social sciences has made it possible to promote integrative approaches capable of linking historical legal experience with contemporary normative challenges (Barros & Bores, 2024). Likewise, current trends in higher education highlight the need to consolidate academic models geared toward the generation of critical knowledge and the comparative study of legal institutions, fostering new interpretations of traditional categories of private law (Cárdenas-Palomino et al., 2024).

Furthermore, processes of continuing education and the updating of scientific knowledge are essential elements for the development of innovative research in the legal field, enabling the reinterpretation of classic phenomena in light of contemporary issues related to the protection of freedom of contract and the safeguarding of subjective rights (Quiroz et al., 2025).

This discussion is particularly relevant when the situation of fear does not stem from a direct threat made by a specific individual, but rather from a political, institutional, or social context characterized by dynamics of widespread intimidation. In such circumstances, legal doctrine has noted that the violence may not originate from a specific person, but rather from an environment, a political climate, or a social atmosphere capable of decisively influencing the formation of contractual intent (Saco, 2004). From this perspective, it has been argued that so-called political violence occupies a middle ground between classical moral violence and the state of necessity, making it difficult to classify within traditional legal categories.

In this context, Roman law offers particularly fertile ground for the historical-comparative analysis of these issues. As Zimmermann (1996) has noted, many of the fundamental institutions of contemporary private law find their conceptual ro s in the solutions developed by Roman jurisprudence, whose influence continues to be decisive in the dogmatic configuration of continental legal systems.

The protection granted by the praetor through the clause *Quod metus causa gestum erit, ratum non habebo* constitutes one of the most significant examples of this historical continuity. The scope of this protection raises the question of whether the Roman legal system was limited exclusively to sanctioning acts of coercion committed by specific individuals or whether, on the

contrary, it recognized the possibility of protecting those who acted under the influence of political fear, institutional violence, or situations of pervasive intimidation (Kupisch, 1974).

Roman literary and legal sources, particularly the writings of Cicero, Seneca, and Ulpian, suggest that concern over the legal consequences arising from scenarios of collective violence was not foreign to the Roman experience. Indeed, the climate of political insecurity that prevailed during the final decades of the Republic including proscriptions, confiscations of property, and the abusive practices of certain provincial magistrates could have created situations in which consent was given under pressure stemming not necessarily from individual threats, but from a generalized context of fear.

In this regard, various studies of Roman law have shown that the evolution of the actio quod metus causa reveals a progressive shift toward protecting the victim of intimidation, shifting the focus from the perpetrator's unlawful conduct to the effects produced on the affected individual's freedom of decision-making. This perspective allows us to reconsider whether certain contemporary scenarios of political or environmental violence might find conceptual precedents in the legal solutions developed by Roman law.

Consequently, the objective of this chapter is to examine, from a diachronic perspective, the relationships between political violence, environmental violence, and commercial activity in Roman legal practice, with the aim of determining whether the praetorian mechanisms of protection against metus constituted a response broad enough to encompass situations characterized by contexts of collective intimidation and not merely by individual threats directed at the execution of a specific legal transaction.

The Octavian Formula and the Origins of Praetorian Protection Against "metus"

Reflection on political violence in Roman law requires an examination of the procedural mechanisms devised by the praetor to protect those who had performed legal acts under conditions of fear or coercion. Among these instruments, the so-called Octavian Formula stands out; it is considered by legal scholars to be one of the most significant precursors to the later actio quod metus causa (Tarwacka, 2018).

The sources allow us to situate the emergence of this remedy within the political context of the final decades of the Roman Republic, characterized by civil conflicts, proscriptions, abuses of power, and frequent episodes of violence used as an instrument of political and economic domination. Against this backdrop, praetorian tutela began to shift progressively toward protecting those who had suffered financial losses resulting from actions carried out per vim aut metum, allowing for the restitution of whatever had been obtained through intimidation or coercion (Tarwacka, 2018).

The classic reference to the Octavian Formula is found in Cicero's *Verrines*, in which he recounts the request made by Senator Gallus to the propraetor Metellus to grant an action against Apronius:

he requested of Lucius Metellus that, by virtue of his edict, he bring a suit against Apronius for what he had taken by force or fear, a formula that Metellus had used in Rome and was using in the province (Cic., In Verrem 2.3.152).

This passage from Cicero reveals that the primary purpose of this legal remedy was not exclusively to punish the perpetrator of the violence, but fundamentally to prevent situations

arising from intimidation and fear from producing legal effects. Legal scholarship has noted that the evolution of the praetorian tutela reveals a progressive concern for protecting the affected party's freedom of decision-making, shifting the emphasis from the unlawfulness of the aggressor's conduct to the legal consequences arising from an act performed under duress (Domínguez López, 2024).

Of particular interest is the episode involving Apronius, who was closely associated with Verres during his administration of Sicily. According to Cicero's account, Apronius frequently resorted to threats, abuse, and extortionate practices to obtain undue economic advantages. His political proximity to Verres constituted an additional source of pressure that strengthened his position vis-à-vis those who had to deal with him in economic and administrative matters (In Verrem 2.3.61).

From a contemporary perspective, this situation is particularly significant because it raises the possibility of scenarios in which fear does not necessarily stem from an explicit threat aimed at securing a specific business deal, but rather from a political context characterized by arbitrariness, legal uncertainty, and the abuse of power. In today's terms, it could be argued that the atmosphere created by Verres in Sicily fostered conditions akin to what modern legal doctrine identifies as political violence or environmental violence.

In this regard, various studies have highlighted that the scope of protection afforded by the "quod vi metusve causa" clause may have allowed for the inclusion of situations in which the fear experienced by the victim was not necessarily linked to an individualized threat, but rather to a generalized environment of intimidation capable of influencing the parties' contractual intent (Tarwacka, 2018).

The edictal formulation is particularly relevant because it focuses on the act performed out of fear rather than on identifying the party who created the intimidating situation. Thus, the clause appears to be primarily oriented toward protecting free and spontaneous consent, regardless of whether the fear was caused by a specific third party or by circumstances arising from a particular political or social context.

Indeed, recent research on Roman law has highlighted that the study of *metus* continues to offer important interpretive tools for understanding the relationships between violence, consent, and the validity of legal transactions, especially in cases where the pressure exerted on the subject's will stems from structural or institutional phenomena and not exclusively from an individualized threat (Domínguez López, 2024).

From this perspective, the Octavian Formula can be understood as a particularly relevant historical precedent for the contemporary analysis of political violence and the limitations that certain social, economic, and political contexts may impose on " " private autonomy. The Roman experience demonstrates that praetorian law was capable of developing sufficiently flexible protective mechanisms to respond to situations in which freedom of decision was affected by power dynamics that transcended the mere interpersonal relationship between the perpetrator of the threat and the victim of intimidation.

Quod metus causa gestum erit, ratum non habebo: the scope of praetorian protection against fear

The evolution of judicial protection against psychological abuse in Roman law finds one of its most significant expressions in the edictal clause *Quod metus causa gestum erit, ratum non

habebo*, which was later incorporated into the Praetor's Edict and extensively discussed in classical case law. This formula marks a turning point in the legal construction of "metus," as it progressively shifts the focus from the unlawful conduct of the perpetrator of the intimidation to the subjective situation of the person acting under the influence of fear.

The text preserved by Ulpian in the Digest allows us to appreciate the conceptual breadth of this protection:

The praetor said: "Quod metus causa gestum erit, ratum non habebo." It was formerly issued as "quod vi metusve causa": for "vis" referred to coercion imposed against one's will, while "metus" referred to the agitation of the mind caused by an imminent or future danger. But later, "vis" was removed from the phrase because whatever is done through atrocious force is also deemed to be done through fear (Ulp. 11 ad ed., D. 4.2.1).

The edictal clause makes it clear that the praetor does not focus on the perpetrator of the violence but rather on the act committed by the person who acted under conditions of fear. This circumstance has led some contemporary scholars of Roman law to consider that the praetorian remedy had a broader scope than that traditionally attributed to it by interpretations focused exclusively on the existence of an individualized threat (Tarwacka, 2018).

Indeed, the wording of the edict shows that the decisive factor was the existence of a state of fear intense enough to affect the individual's free will, regardless of the specific identification of the person who had caused that psychological state. From this perspective, the Roman notion of metus could encompass not only cases of direct intimidation but also social or political contexts characterized by an atmosphere of insecurity capable of impairing contractual autonomy.

The evolution of terminology is equally significant. According to Ulpian, the oldest version of the edict contained the expression *quod vi metusve causa*, whereas the explicit reference to *vis* later disappeared, since any serious violence was considered to generate fear. The removal of the term *vis* did not imply a narrowing of the scope of protection, but rather a conceptual broadening of *metus*, understood as a category capable of encompassing various forms of coercion of the will (Domínguez López, 2024).

In this context, Roman case law appears to have recognized a close connection between necessitas, present or future danger, and the individual's psychological distress. Legal scholarship has emphasized that this relationship constitutes one of the most innovative aspects of praetorian law, as it anticipated discussions that remain relevant today regarding the boundaries between moral violence, states of necessity, and situations of structural pressure (Tarwacka, 2018).

From a historical-legal perspective, the breadth of the clause quod metus causa gestum erit calls into question the interpretation that Roman law restricted protection exclusively to cases of violence exercised with the specific purpose of obtaining a particular transaction. The wording of the edict appears to require only a causal link between the fear experienced by the individual and the legal act performed, without necessarily requiring that the threat have been intentionally directed toward producing that specific result.

Consequently, Roman legal practice offers elements of particular interest for the contemporary analysis of so-called forms of political or environmental violence. If the basis for the praetor's protection rested on the actual impairment of an individual's freedom of decision, it could be argued that certain contexts of political domination, institutional persecution, or social insecurity might also have fallen within the scope of the protection promised by the praetor.

This interpretation takes on greater relevance when examining the literary and rhetorical sources preserved by the Roman legal tradition, particularly those contained in the *Controversiae* of Seneca the Elder, which present scenarios illustrating how certain political circumstances could decisively influence the formation of consent and the validity of legal acts performed under conditions of fear.

The breadth of the clause *Quod metus causa gestum erit, ratum non habebo* thus demonstrates Roman law's capacity to offer flexible solutions to complex phenomena of coercion, placing at the center of legal analysis the protection of free will and the preservation of contractual autonomy in contexts prone to generating intimidation, uncertainty, or dependence.

Political Violence in Seneca's *Controversiae*: The Case of the Proscribed Patron

A particularly relevant source for examining the possible extension of praetorian protection to situations of political violence is found in the *Controversiae* of Seneca the Elder. Although these works are rhetorical and scholastic exercises, they represent an extraordinarily valuable source for understanding the social reception of certain Roman legal principles and the doctrinal discussions they sparked (Tarwacka, 2018).

The case presented by Seneca is prefaced by a formula that significantly echoes the language characteristic of praetorian protection: PER VIM METVMQVE GESTA IRRITA SINT.

The case under discussion involves a patron who was proscribed during a civil war and forced to seek refuge in the home of his former freedman. The freedman agrees to grant him protection but requests, in return, the remission of the operae libertorum. The master accepts this request in writing. Once restored to his legal and political standing, he seeks to recover the benefits previously granted, while the freedman opposes this, arguing that the waiver granted remains valid.

From a legal perspective, the significance of this episode lies in determining what factor led the master to waive his rights. The arguments put forward by the parties seem to indicate that the decision was a consequence of the fear generated by the political situation resulting from the proscriptions, rather than a specific threat made directly by the freedman. The freedman's defense emphasizes precisely this circumstance: Non mea sed aliena vis fuit.

In other words, he maintains that the violence that led to the waiver of the benefits did not originate from him, but rather from external factors linked to the prevailing political context. The employer, on the other hand, argues that punishment is warranted not only for those who personally commit acts of violence, but also for those who profit by taking advantage of an intimidating situation created by others: Aeque dignus est poena qui ipse vim adhibet quam qui ab alio admota ad lucrum suum utitur.

This line of reasoning is particularly significant because it seems to anticipate debates that remain relevant in contemporary civil law doctrine regarding so-called political violence, institutional violence, or environmental violence forms of violence characterized by the absence of an individualized threat aimed at securing a specific business transaction, yet capable of generating objective conditions of fear that influence the formation of consent.

In this sense, the case described by Seneca could be interpreted as a paradigmatic example of contextual or structural violence. The employer's inclusion on the proscription lists, the climate

of political persecution, and the uncertainty stemming from the civil conflict constituted factors intense enough to induce the performance of legal acts that likely would not have been entered into under normal circumstances.

From this perspective, the controversy raises a central question: whether the protection promised by the praetor through the clause *quod metus causa gestum erit, ratum non habebo* could extend to situations in which the fear stemmed from a hostile political environment and not exclusively from an individual threat.

Several recent studies have pointed out that the broad scope of the edictal formulation would support an affirmative answer. The clause does not expressly require that the fear stem from a threat made by a specific individual, but only that there be a causal relationship between the state of fear and the legal act performed. Consequently, the judicial protection could also have encompassed those cases in which consent appeared to be conditioned by collective acts of intimidation or by political contexts characterized by arbitrariness and institutionalized violence (Domínguez López, 2024).

The discussion takes on special relevance when one considers that contemporary civil law doctrine continues to debate the possibility of including cases of political violence within the general framework of defects in consent. It is often argued that these situations lack the requirement of a direct threat aimed at securing a specific transaction a requirement traditionally associated with moral violence. However, Roman experience seems to suggest a more flexible understanding of the phenomenon of intimidation, focused primarily on the actual impairment of the individual's freedom of decision-making (Tarwacka, 2018).

Consequently, the case of the proscribed patron reported by Seneca constitutes a particularly instructive historical precedent for reconsidering contemporary doctrinal categories relating to contractual coercion. The Roman conception of *metus* appears to have recognized that certain political circumstances could generate sufficient levels of fear to justify the legal system's intervention in defense of private autonomy.

From this perspective, the *Controversiae* offer valuable insight into Roman law's capacity to address complex situations involving the conditioning of the will anticipating discussions that continue to occupy a prominent place in the analysis of political violence, structural coercion, and the protection of contractual freedom.

The actio quod metus causa and the problem of the causal link between fear and legal transactions

The evolution of the actio quod metus causa reveals a gradual shift from a conception centered on the unlawful conduct of the perpetrator of the coercion toward a form of legal protection primarily oriented toward the effects produced on the will of the party entering into the legal transaction. This transformation allowed praetorian law to develop particularly flexible mechanisms to invalidate acts entered into under circumstances of serious fear, even when the relationship between the threat and the act performed did not follow a strictly linear causal structure (Zimmermann, 1996).

The broad scope of the edictal clause *quod metus causa gestum erit, ratum non habebo* demonstrates that the praetor's concern was directed primarily at the legal consequence produced by fear and not exclusively at identifying the party who had caused it. It is precisely this characteristic that has led various scholars to argue that the actio quod metus causa

represented one of the most advanced instruments of Roman law for correcting situations of contractual imbalance arising from contexts of social, political, or economic pressure (Johnston, 1999; du Plessis, 2020).

In this regard, contemporary legal scholarship has noted that the Roman concept of metus had a notably broad scope, capable of encompassing situations in which fear stemmed from structural or environmental conditions capable of significantly restricting contractual freedom. From this perspective, the legal relevance of fear did not necessarily depend on the existence of an explicit threat directed at the conclusion of a specific transaction, but rather on establishing that consent had been given under pressure intense enough to alter the process of forming one's intent (Borkowski, 2015).

The interpretation of causation in cases involving violence has also sparked significant debates within contemporary civil law doctrine. While some authors continue to defend the need for a direct causal relationship between the intimidating conduct and the transaction entered into, others argue that the analysis should focus on the actual impact of the context of fear on the individual's decision-making autonomy. This latter approach finds interesting precedents in Roman law, where the formulation of the actio quod metus causa seemed to allow for a more flexible causal relationship between the state of fear and the transaction entered into (Zimmermann, 1996; Johnston, 1999).

From a comparative historical perspective, it is particularly significant to observe how various modern civil legal systems continue to reproduce conceptual categories whose origins can be traced to classical Roman law. The current discussion on political violence, environmental violence, and indirect forms of coercion highlights the continued relevance of legal issues that had already been addressed by Roman jurisprudence through procedural instruments characterized by their remarkable interpretive flexibility (du Plessis, 2020).

Reflection on the causality of fear also takes on special relevance in contemporary societies subject to phenomena such as political polarization, institutional violence, and persistent economic crises. In these scenarios, consent may be conditioned by collective circumstances capable of generating permanent states of insecurity an issue that invites us to reconsider the traditional limits of moral violence and to rethink the protective scope of institutions designed to safeguard contractual freedom.

Consequently, the actio quod metus causa can be understood as a particularly useful historical precedent for the modern reinterpretation of categories related to contractual coercion, especially in cases where fear arises from structural or systemic contexts and not exclusively from individualized threats.

Political Violence, Environmental Violence, and the Contemporary Reconsideration of Vices of Consent

An examination of Roman sources reveals that the praetorian protection against metus had a potentially broader scope than that traditionally recognized by some contemporary civil law scholars. The clause *Quod metus causa gestum erit, ratum non habebo* focused legal attention on the act performed under a legally relevant situation of fear, without necessarily requiring the identification of the specific person who had caused that state of fear.

From this perspective, Roman protection appears to have prioritized the actual impairment of contractual freedom over the strict identification of the perpetrator of the threat, thereby

establishing a particularly flexible model of protection against socially complex forms of coercion (Frier & McGinn, 2004; Tellegen-Couperus, 1993).

The discussion takes on particular relevance in relation to the modern categories of political violence and environmental violence, understood as situations in which consent is formed within contexts dominated by power structures, repressive regimes, armed conflicts, political persecution, or scenarios of collective intimidation.

From this perspective, the determining factor would not be exclusively the existence of an individualized threat, but rather the presence of a context objectively capable of significantly restricting the subject's freedom of decision. This issue finds parallels in recent developments in general contract theory, particularly in debates on contractual vulnerability, structural inequality, and private autonomy in contexts of power asymmetry (Hesselink, 2015; Micklitz, 2018).

Contemporary legal scholarship has pointed out that contractual autonomy cannot be analyzed in isolation from the political, economic, and social conditions in which it manifests itself. Consequently, certain phenomena of collective coercion can have a real impact on contractual intent even when there is no individualized threat issued by a specific person. In this regard, the Roman categories of metus, necessitas, and periculum offer conceptual tools of considerable utility for reinterpreting the current boundaries between moral violence, a state of necessity, and the exploitation of situations of vulnerability.

Roman legal practice demonstrates that legal protection against fear was not necessarily linked to the punishment of the perpetrator of a tort, but also to the restoration of the balance disrupted by circumstances capable of seriously compromising the freedom of consent. It is particularly significant that the actio quod metus causa evolved into an action of an in rem nature, a circumstance that allowed the claim to be directed even against those who had benefited from the situation of intimidation, regardless of whether they had directly participated in creating the threat (Zimmermann, 1996).

The breadth of this legal construct could contribute to a reconsideration of some of the restrictive criteria present in contemporary civil law systems, especially those that continue to require a direct causal relationship between the threat and the legal transaction entered into. Indeed, various historical experiences show that property-related decisions made in contexts of institutionalized violence, political persecution, or environmental domination can be just as detrimental to contractual freedom as those arising from individualized threats.

This takes on particular relevance in contemporary societies characterized by phenomena such as forced displacement, humanitarian crises, internal armed conflicts, and structural economic pressures that condition the formation of consent. Consequently, an evolutionary interpretation of the Roman law tradition could provide doctrinal grounds for expanding the protection of private autonomy against new manifestations of social coercion, thereby preserving the protective function that historically inspired praetorian intervention.

Conclusions

An analysis of political violence and commercial activity from a diachronic perspective reveals that Roman legal practice developed protective mechanisms whose conceptual breadth is particularly useful for interpreting contemporary phenomena linked to coercion exercised through contexts of power, structural violence, or situations of institutional instability. The evolution of praetorian remedies demonstrates that Roman law was not limited to a strictly individual view of violence, but rather developed instruments capable of addressing cases in

which fear stemmed from political, social, or environmental circumstances that decisively constrained contractual freedom.

A study of the Formula Octaviana reveals that, from the end of the Roman Republic onward, there was a concern to restore the patrimonial balance disrupted by acts carried out per vim aut metum. Cicero's references in the Verrines show that this remedy emerged in a context characterized by administrative corruption, political pressures, and the systematic use of intimidation in economic relations. Consequently, the praetorian tutela appears to have been aimed not only at sanctioning the actual perpetrator of the threat but also at depriving transactions entered into under conditions of socially induced fear of legal validity.

Furthermore, an examination of the edictal clause *Quod metus causa gestum erit, ratum non habebo* reveals a gradual shift in legal focus from the conduct of the perpetrator of the violence toward the victim's situation and toward the actual impact of fear on consent. The wording of the edict, centered on what was done "metus causa," reveals a broad conception of coercion, capable of encompassing scenarios in which fear stems from a particularly oppressive political or social environment, even when no specific individual can be identified as the direct source of the threat.

In this regard, the *Controversiae* of Seneca the Elder constitute a source of particular relevance, as they demonstrate how Roman legal thought was capable of considering situations in which the political context of proscriptions, persecutions, and civil conflicts created conditions sufficient to impair the autonomy of the will. The case of the proscribed patron and the freedman who gained financial advantages by taking advantage of that situation demonstrates that the issue of so-called political violence has deep historical roots and that the Roman experience offers useful interpretive elements for understanding similar phenomena in contemporary legal systems.

Likewise, the study of the actio quod metus causa supports the argument that Roman law developed a more flexible notion of legal causation than some modern legal scholars have traditionally acknowledged. The absence of an express requirement that the threat be directed specifically at the conclusion of the transaction calls into question restrictive interpretations that exclude from the scope of moral violence those cases in which consent is conditioned by situations of collective fear, institutionalized violence, or environmental pressure. Consequently, the Roman experience appears to offer grounds for reconsidering the dogmatic boundaries between moral violence and the state of danger.

Finally, the research highlights that current discussions regarding political, environmental, or structural violence in private law have significant precedents in the Roman law tradition. This confirms the methodological relevance of Roman law as a tool for historical and comparative interpretation, as well as its usefulness for rethinking classical categories of consent in light of increasingly complex social realities. The possibility of legally recognizing forms of coercion arising from the political and economic context ultimately constitutes a challenge for contemporary civil law systems and an invitation to reconsider the balance between private autonomy, contractual justice, and the effective protection of freedom of contract.

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The "aut dedere aut punire" Principle and Its Roots in Roman Law: Toward a Genealogy of Extradition Law

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Introduction

Legal systems have historically contributed to the development of societies both in antiquity and in the modern era by establishing norms, principles, and institutions designed to guarantee social order, collective security, and peaceful coexistence among political communities. The existence of mechanisms designed to prevent impunity for conduct that seriously undermines institutional stability is a constant feature of the evolution of law, a circumstance that explains the emergence of customary practices aimed at handing over individuals pursued for committing crimes to other towns, cities, or provinces, so that they may be tried or punished by the competent authorities. These practices responded to the need to preserve harmony in individual and collective relations and to protect the legal structure of politically organized societies (Sosa Navarro, 2015).

The historical-legal study of institutions such as extradition and international criminal cooperation takes on special relevance in the contemporary academic context, as it allows for an understanding of the evolution of normative categories that continue to influence public international law and current constitutional systems. In this regard, research in the social and legal sciences requires interdisciplinary approaches that foster critical analysis of historical sources and the construction of contextualized knowledge, capable of linking classical legal precedents with the normative challenges of the present (Barros & Bores, 2024). Likewise, contemporary university education has emphasized the need to strengthen legal research through comparative, historical, and analytical methodologies aimed at developing interpretive skills that enable an understanding of the continuity and transformation of legal institutions over time (Cárdenas-Palomino et al., 2024). From this perspective, examining the Roman roots of the principle **aut dedere aut punire** constitutes an exercise in historical reconstruction that helps explain the current configuration of international mechanisms designed to combat impunity.

The *primary* motivation for this legal study stems from the recent debate in Ecuador regarding the extradition request filed by the United States of America concerning José Adolfo Macías Villamar, alias *Fito*, leader of the criminal organization Los Choneros, who is linked to transnational organized crime and drug trafficking. This is a particularly significant case because Article 79 of the Constitution of the Republic of Ecuador expressly prohibits the extradition of Ecuadorian citizens, which creates a tension between the domestic constitutional order and the contemporary demands of international criminal cooperation (National Constituent Assembly, 2008).

This issue serves as an ideal starting point for analyzing, from a retrospective perspective, the obligation of modern states to surrender persons sought by other jurisdictions or, alternatively, to bring them to trial within their own territory, regardless of their nationality, in accordance with the tenets of the principle *of *aut dedere aut punire*,* later reformulated as **aut dedere aut iudicare**. This principle currently represents one of the most important mechanisms in the international fight against impunity, serving as an essential tool for ensuring cooperation among

states in the prosecution of particularly serious crimes and in the consolidation of an international legal order grounded in criminal responsibility and access to justice (Plachta, 1999; Scharf, 2008).

The *"aut dedere aut iudicare"* principle has a distinctly customary character and has been progressively incorporated into numerous international treaties concerning the prosecution of international crimes, terrorism, torture, enforced disappearance, counterfeiting, and other conduct considered to be an attack on the fundamental interests of the international community. However, its historical roots date back to ancient civilizations including Egypt, the Hebrew world, Greece, and Rome where practices can be identified that were intended to ensure the surrender of individuals accused of conduct that disrupted the political, religious, or military order of organized communities (Nussbaum, 1954; Sosa Navarro, 2015).

It is precisely in the Roman legal tradition that a more complex process of institutionalization of these practices can be observed. Although the modern concept of extradition is foreign to the technical language of classical Roman law, various historical sources attest to the existence of legal mechanisms for restitution, surrender, and cooperation among political entities linked to Rome through treaties (*foedera*) or subject to its imperial authority. Such mechanisms were particularly related to conduct that affected the *pax deorum*, the inviolability of ambassadors, the stability of the provinces, and the security of *the populus romanus* (Fernández de Buján, 2006; Ferrini, 2017).

In this regard, Ferrini argues that Rome had relatively well-developed forms of handing over individuals sought by other political communities, although these practices took place within relationships of subordination derived from Roman imperial supremacy and not under the criteria of sovereign equality characteristic of contemporary international law (Ferrini, 2017). Hence, numerous authors consider extradition, in the technical sense, to be an essentially modern institution, linked to the emergence of the sovereign state and the consolidation of the principle of legal equality among nations following the Treaties of Westphalia in 1648 (Shearer, 1971; Nussbaum, 1954).

Specialized legal scholarship agrees that the systematic formulation of the principle *of *aut dedere aut punire** finds one of its fundamental milestones in the work of Hugo Grotius, who, in *De iure belli ac pacis**, established that states have the obligation to either surrender the perpetrator of a crime or proceed to try them, thereby establishing one of the doctrinal pillars of the modern system of international criminal cooperation (Grotius, 1925; Scharf, 2008). However, this theoretical construct did not arise in isolation but draws extensively on Roman legal categories, the natural law tradition, and the medieval reception of *the *Corpus Iuris Civilis**, allowing us to affirm that the contemporary principle of extradition has a deep historical genealogy.

Consequently, the objective of this study is to analyze the Roman roots of the principle *of aut dedere aut punire*, identifying its historical antecedents, its manifestations in the Roman legal practice, and its subsequent reception in modern international law. Furthermore, the study aims to examine the extent to which Roman practices regarding the surrender of prosecuted individuals can be considered precursors to current extradition law and to international obligations aimed at eradicating impunity.

The research adopts a qualitative, historical-legal, and comparative methodology, grounded in the analysis of Roman legal sources, classical doctrinal texts, and contemporary specialized literature, with the aim of reconstructing a legal genealogy of the institution of extradition and contributing insights to the current constitutional and international criminal law debate.

Conceptual and Doctrinal Approaches to the "aut dedere aut punire" Principle and Its Modern Formulation

It should be noted that one of the distinctive features of Roman legal science was its markedly casuistic nature. Classical jurists developed concrete solutions to specific problems, generating an ongoing legal dialectic grounded in the interpretation of cases and the progressive elaboration of normative responses, rather than in the construction of closed dogmatic systems (Bretone, 2008; Fernández de Buján, 2006). This circumstance explains why Roman law did not recognize a technical conceptualization of extradition nor did it expressly formulate the principle *of aut dedere aut punire* in the terms in which it is currently understood under public international law.

In fact, during the period when Roman law was in force, there was no legal category equivalent to modern extradition, conceived as the procedure by which one State hands over to another a person accused or convicted of committing a crime so that they may be tried or serve a criminal sentence in the requesting territory (Shearer, 1971). However, this does not imply the absence of functionally similar practices. Historical sources reveal various mechanisms for the surrender of individuals pursued for conduct that threatened political stability, diplomatic relations, or the security of *the populus romanus*, particularly when such actions disrupted the *pax deorum* or harmed interests considered essential to the Roman community (Ferrini, 2017).

Contemporary legal scholarship agrees that these practices must be analyzed with methodological caution, avoiding anachronistic projections onto institutions whose legal framework stems from profoundly different historical contexts. Nevertheless, it is also recognized that certain Roman precedents served as sources of inspiration for later doctrinal developments related to interstate cooperation and international responsibility arising from the commission of particularly serious crimes (Plachta, 1999).

From a historical perspective, various authors have identified the medieval reception of the Corpus Iuris Civilis as a turning point in the evolution of ideas regarding universal jurisdiction and the surrender of individuals pursued for unlawful acts. The School of the Postglossators played a significant role in this process, particularly through the reflections developed by Bartolo of Sassoferrato and Baldo of Ubaldis, who made important contributions regarding sovereignty, territorial jurisdiction, and the legal relationships between distinct political entities (Villey, 1978).

Subsequently, thinkers from the School of Salamanca, including Francisco de Vitoria, Diego de Covarrubias, and Francisco Suárez, incorporated elements of natural law that would contribute to the doctrinal consolidation of the idea of an international community governed by common principles, laying the groundwork for the further development of the law of nations and mechanisms for judicial cooperation among states (Nussbaum, 1954).

However, the classical formulation of the principle *aut dedere aut punire* is usually attributed to Hugo Grotius, considered one of the principal founders of modern international law. In his work *De iure belli ac pacis* (On the Law of War and Peace), published in 1625, the Dutch jurist argued that when a person responsible for a crime takes refuge in the territory of another State, the latter has the obligation to adopt one of two alternatives: to punish the person or to allow them to be tried by whoever legitimately claims jurisdiction.

Furthermore, the original expression *aut dedere aut punire* was gradually replaced by the formula *aut dedere aut iudicare*, in line with the transformations undergone by contemporary constitutionalism and with the consolidation of fundamental procedural guarantees derived from

the 1789 Declaration of the Rights of Man and of the Citizen and subsequent international instruments for the protection of human rights.

This terminological evolution reflects a substantial change in the legal substance of the principle. The State's alternative obligation no longer consists of directly punishing the alleged perpetrator, but rather of subjecting them to a judicial process that fully respects the guarantees of due process, the presumption of innocence, and the right to an effective defense, which may result in either a conviction or an acquittal (Plachta, 1999; Sosa Navarro, 2015).

This reformulation takes on particular importance in the contemporary context, in which the principle *of aut dedere aut iudicare* has been incorporated into numerous multilateral treaties concerning the prosecution of international crimes. Legal scholarship recognizes that its codification began to gain prominence in the 1929 International Convention for the Suppression of Counterfeiting Currency, and was subsequently developed in the 1949 Geneva Conventions and in various treaty instruments aimed at combating torture, terrorism, enforced disappearance, and other crimes of international significance (Plachta, 1999; Scharf, 2008).

From this perspective, the principle of *aut dedere aut iudicare* currently constitutes a concrete manifestation of the duty of international cooperation in criminal matters, the essential purpose of which is to prevent the perpetrators of serious crimes from finding refuge in zones of impunity arising from jurisdictional gaps or the absence of effective mechanisms for interstate collaboration. Its consolidation reflects the gradual transformation of an ancient customary practice into a genuine international legal obligation, grounded both in the protection of the collective interests of the international community and in the guarantee of access to justice for victims of particularly serious crimes.

Extradition in Roman Law: Practice, Legal Foundations, and Roman Regulations

From the origins of Rome whose historical tradition was recorded by Titus Livius the political and military expansion of the populus romanus was accompanied by the gradual development of legal mechanisms designed to regulate relations with other peoples and political communities. Although the role of military force in consolidating Roman dominance is frequently emphasized, historical research has shown that the construction of imperial power also rested on legal institutions and diplomatic formulas that made it possible to establish stable relationships with allies, provinces, and subjugated territories (Buono-Core Varas, 2003; Galindo Roldán, 2013).

In this context, the *foedera populi romani* solemn treaties that constituted one of the earliest manifestations of legal cooperation between distinct political entities took on particular significance. These agreements sought to guarantee the stability of Rome's foreign relations, preserve peace, and ensure compliance with reciprocal obligations especially those related to the inviolability of ambassadors, respect for concluded treaties, and the suppression of conduct deemed a threat to the security of the Roman state (Bressel Baratto, 2016).

Various authors argue that, even though one cannot speak of public international law in the contemporary sense, it is possible to identify in the Roman experience institutions that foreshadowed certain principles currently associated with interstate cooperation and international legal assistance (Galindo Roldán, 2013). Among these, the practice of handing over individuals accused of committing acts that compromised Rome's political, religious, or military

stability stands out, especially those related to attacks on ambassadors, rebellions, treason, or conduct contrary to the *pax deorum* (Ferrini, 2017).

During the Republican period, certain judicial bodies, such as the recuperatores, exercised jurisdiction over disputes arising between Roman citizens and foreigners, as well as over controversies involving claims from other allied peoples. Legal scholarship has noted that certain decisions made by these magistracies constitute early precursors to later mechanisms of criminal cooperation between political communities (Fernández de Buján, 2006).

Historical sources also record instances in which Rome agreed to hand over Roman citizens sought by other peoples, a situation that has sparked significant scholarly debate regarding the possible relationship between these practices and the institution of *noxae deditio*, through which liability arising from certain offenses could be transferred by handing over the perpetrator of the harm (Watson, 1985). Although these institutions were based on a legal logic distinct from modern extradition, they demonstrate the existence of mechanisms designed to prevent situations of impunity arising from the movement of persons across different jurisdictions.

The Empire's territorial expansion and the growing administrative complexity of the provinces spurred the development of regulatory provisions designed to coordinate the actions of provincial governors in response to crimes committed by individuals who were outside the territory where the unlawful conduct had taken place. In this regard, the *Corpus Iuris Civilis* compiled various regulations concerning the powers of governors, granting them authority to preserve public order and prevent provincial borders from becoming safe havens for those who had committed serious crimes (Mommsen & Krüger, 2014).

Likewise, Justinian's imperial legislation reveals the existence of administrative procedures that allowed for communication between provincial authorities to request the transfer of individuals accused of crimes, as well as sanctions against officials who unjustifiably obstructed or delayed such procedures. These provisions reveal a constant concern for ensuring the effectiveness of justice and guaranteeing that those responsible would appear before the competent authority to stand trial (Watson, 1985).

Although it is anachronistic to equate these practices with extradition in the technical sense, there is no doubt that they constitute relevant historical precedents for interstate judicial cooperation. Consequently, Roman legal practice offers significant insights into the evolutionary process that led, centuries later, to the formulation of the principle *aut dedere aut punire* and, subsequently, of the contemporary maxim *aut dedere aut iudicare*, which has today become one of the fundamental pillars of international criminal law and of the mechanisms for combating international impunity (Plachta, 1999; Scharf, 2008).

Toward a Genealogy of Extradition Law and Its Reception in Contemporary International Law

The term "extradition" is a relatively recent terminological construct within legal language. Its etymology derives from the Latin prefix *ex* (out) and the noun *traditio* (surrender), expressing the idea of transferring a person outside one's own jurisdiction so that they may be subjected to trial or the enforcement of a penalty in another territory. However, although the term belongs to modern law, the practices that preceded it have much older roots and can be traced back to various civilizations of the ancient Mediterranean, particularly in Rome, where legal mechanisms were developed to preserve political stability and relations between organized communities (Bressel Baratto, 2016; Galindo Roldán, 2013).

Contemporary extradition is inseparable from the formation of the sovereign state. Its legal consolidation is closely linked to the historical process that began after the Peace of Westphalia in 1648, when the principle of sovereign equality among states was established and the foundations of modern public international law were laid (Nussbaum, 1954; Villey, 1978). From that point on, interstate cooperation in criminal matters ceased to depend exclusively on relationships of political or military domination and began to be structured through treaties, conventions, and permanent institutional mechanisms.

However, this transformation did not signify a complete break with the Roman legal tradition. On the contrary, many of the principles that currently underpin extradition have their conceptual roots in the legal experience of Rome. The protection of legacies, the punishment of conduct deemed offensive to the populus romanus, the prosecution of those who threatened the maiestas, and the practices of returning offenders are historical expressions of a constant concern to prevent pockets of impunity beyond political borders (Ferrini, 2017; Fernández de Buján, 2006).

International legal doctrine has noted that the principle of aut dedere aut iudicare represents one of the most fully developed manifestations of this historical continuity. Although its normative formulation is essentially modern, its philosophical foundation stems from the idea already present in the classical tradition that no legal system can allow certain particularly serious acts to be exempt from prosecution on territorial or jurisdictional grounds (Plachta, 1999; Scharf, 2008). In this sense, the alternative obligation to extradite or prosecute constitutes a mechanism designed to prevent the existence of safe havens for those who have committed crimes of international significance.

The evolution of this principle was influenced by profound political and ideological transformations that took place between the 18th and 20th centuries. The consolidation of liberal constitutionalism, the recognition of due process guarantees, and the emergence of international human rights protection systems substantially altered the classic " " conception of the surrender of offenders. The old formulation *aut dedere aut punire* was gradually replaced by the expression *aut dedere aut iudicare*, as the emphasis shifted from focusing exclusively on the imposition of a sentence to ensuring a judicial process compatible with contemporary standards of due process, the presumption of innocence, and effective judicial protection (Sosa Navarro, 2015; Shearer, 1971).

The traumatic experience of World War II accelerated this transformation. The development of international criminal law and the emergence of new categories of international crimes spurred the incorporation of this principle into numerous treaty instruments. The 1929 Convention for the Suppression of Counterfeiting Currency is considered one of the first treaties to expressly codify this obligation, which was subsequently adopted by the 1949 Geneva Conventions, the 1984 Convention Against Torture, and various instruments aimed at combating terrorism, transnational organized crime, and other particularly serious crimes (Plachta, 1999; Scharf, 2008).

Currently, the principle of aut dedere aut iudicare is a fundamental component of the international system of criminal cooperation. Its effectiveness depends on the existence of coordination mechanisms among national jurisdictions, the mutual recognition of judicial decisions, and the progressive harmonization of national laws with the international commitments undertaken by States. In this context, extradition is a complex institution that reconciles the demands of state sovereignty with obligations under international law, seeking a balance between the effective prosecution of crime and the protection of the fundamental rights of individuals subject to extradition proceedings (Monroy Cabra, 1987; Guzmán Latorre, 2003).

The contemporary application of this principle takes on special relevance in Latin America, where the expansion of transnational organized crime has led to a reevaluation of the traditional limits of judicial cooperation. The debate in Ecuador surrounding the extradition of nationals precisely reflects the tensions between historical constitutional principles and the new demands arising from the international fight against complex criminal phenomena. In this context, the Roman origins of the institution of extradition help us understand that criminal cooperation between political communities is not an entirely recent development, but rather the result of a long legal evolution whose roots can be traced back to practices established more than two thousand years ago.

Conclusion

The historical-legal analysis conducted here supports the argument that the principle *aut dedere aut punire*, later reformulated as *aut dedere aut iudicare*, has distant roots in the legal practices developed by ancient civilizations and, in particular, in the Roman experience. Although Roman law did not establish an extradition institution in the contemporary technical sense, it did develop mechanisms for interstate cooperation, the surrender of individuals, and jurisdictional control over conduct that affected the political, religious, and diplomatic order of the Roman world, thus constituting an important precursor to modern international obligations in criminal matters.

This research demonstrates that extradition currently understood as an institution of public international law is the result of a long process of legal evolution that finds in Roman thought essential elements related to the protection of the political community, the preservation of peace among peoples, and the recognition of certain conduct considered particularly harmful to the social order. These precedents were subsequently reinterpreted by the doctrine of natural law particularly beginning with Hugo Grotius until they were consolidated into the contemporary obligation to extradite or prosecute as an instrument of international cooperation aimed at preventing pockets of impunity.

Likewise, it was noted that the transformation of the principle *aut dedere aut punire* into the modern formula *aut dedere aut iudicare* reflects the process of humanizing international criminal law and the strengthening of procedural safeguards derived from modern constitutionalism and the international protection of human rights. In this context, the state's obligation is no longer primarily oriented toward the imposition of punishment, but rather toward ensuring a legitimate judicial process that respects due process, the presumption of innocence, and the other guarantees inherent to the person subject to extradition.

Finally, the study demonstrates that the "aut dedere aut iudicare" principle currently constitutes one of the fundamental pillars of international criminal cooperation, having been incorporated into numerous multilateral treaties, international conventions, and national laws. Its historical development reveals a remarkable continuity between Roman legal practices, the classical doctrine of the law of nations, and the modern demands of international justice, allowing us to affirm that the genealogy of extradition cannot be fully understood without considering the Roman legal legacy and its enduring influence on the construction of the contemporary international legal order.

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The Impact of Artificial Intelligence in Financial Auditing on Corporate Transparency in Guayaquil, 2023–2024: A Legal Approach from the Perspective of Roman Law

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Introduction

Financial auditing is a fundamental pillar of business trust and the credibility of financial statements. Currently, the incorporation of technological tools, especially artificial intelligence (AI), has brought about a radical change in accounting review processes. This phenomenon impacts not only technical efficiency but also the transparency and legality of the information presented by organizations.

In the Latin American context, the development of social science research has emphasized the importance of integrating interdisciplinary approaches that enable an understanding of complex phenomena such as digital transformation in the financial sector. In this regard, Barros and Bores (2024) emphasize that scientific output at Latin American universities should be oriented toward the generation of applied knowledge capable of addressing real-world challenges related to innovation, technology, and society. This perspective is relevant for analyzing the incorporation of artificial intelligence into auditing processes, where technical, ethical, and legal dimensions converge.

In the Ecuadorian context, particularly in Guayaquil, companies have begun to explore AI solutions to optimize their financial practices. However, this technological adoption raises questions regarding the reliability of automated processes and the safeguarding of ethical and legal principles that ensure corporate integrity.

In this scenario, academic training and research in higher education play a key role, as updating professional competencies is essential to addressing the challenges of digital transformation. Cárdenas-Palomino et al. (2024) note that current trends in university education are geared toward strengthening professionals' research, technological, and ethical capabilities, which is essential in fields such as financial auditing, where artificial intelligence is redefining traditional methods of analysis and control.

Historically, Roman law laid the foundations for the principle of fides (good faith), which remains relevant in the modern conception of transparency. Linking this legacy to contemporary financial auditing allows us to analyze how ancient legal precepts interact with the challenges of digitization and the automation of financial controls. , corporate transparency beyond being a regulatory requirement constitutes an essential value for economic development. Artificial intelligence represents an opportunity to strengthen the accuracy of financial reports, although it also introduces risks related to algorithmic opacity, technological dependence, and potential impacts on process traceability.

Likewise, the development of a culture of research in the age of artificial intelligence demands deep ethical reflection. Carlín-Chávez et al. (2024) argue that contemporary scientific research

must incorporate principles of integrity, accountability, and transparency, especially when using emerging technologies such as AI. This perspective is essential for the analysis of financial auditing, where automation cannot be separated from human accountability or ethical oversight of the results.

Complementarily, the use of artificial intelligence in academic and professional research has been extensively studied as a tool that enhances data analysis, improves decision-making, and optimizes complex processes. Tolozano-Benites et al. (2024) emphasize that AI in applied research contexts allows researchers to expand their analytical capabilities, provided its use is accompanied by sound methodological criteria and clear ethical principles. This approach is transferable to the field of financial auditing, where the quality of results depends on both technology and professional judgment.

The 2023–2024 period is particularly relevant due to the rise of technological solutions applied to accounting and corporate auditing in Guayaquil. This context allows us to examine how the convergence of technological innovation and legal regulation impacts the confidence of investors, the government, and society at large. From an academic standpoint, studying financial auditing from an interdisciplinary perspective combining law and technology offers significant insights. By linking legal analysis with the practical application of AI, new avenues for understanding corporate responsibility and transparency as a factor in competitiveness are opened up.

The implementation of artificial intelligence in financial auditing in Guayaquil faces multiple challenges. While the technology promises efficiency and precision, there are latent risks related to the opacity of algorithms and the absence of clear regulations governing their application. Companies that adopt these tools face the challenge of ensuring that the results obtained adhere to the principle of transparency and are not compromised by automated biases. This situation can undermine the confidence of users of financial information, creating uncertainty in decision-making.

A critical issue is the gap between technological innovation and the current legal framework. In Ecuador, accounting and auditing standards do not yet explicitly regulate the use of artificial intelligence in financial processes, creating legal loopholes and interpretation issues. Furthermore, the use of artificial intelligence raises ethical dilemmas regarding liability. Who is legally liable for errors or fraud detected in AI-generated reports: the company, the auditor, or the technology provider? This uncertainty limits clarity in audit processes.

From the perspective of Roman law, the principle of good faith and the duty to act with due diligence are inescapable. However, the risk that technology may obscure the traceability of processes can undermine these legal values, weakening corporate credibility. In Guayaquil, where many companies are undergoing technological modernization, the problem is exacerbated by the coexistence of traditional auditing practices with automated systems. This transition creates tensions within financial teams and may compromise the transparency of reports.

In summary, the lack of clear regulatory guidelines, algorithmic opacity, and tensions between ethics, law, and technology lie at the heart of the problem facing financial auditing as it incorporates artificial intelligence in the pursuit of corporate transparency. Studying this topic is relevant given the need to understand how artificial intelligence impacts financial auditing and corporate transparency in Guayaquil. Analyzing this phenomenon allows us to identify both the opportunities and the risks that the technology brings.

Furthermore, the research contributes to the development of an academic framework that links technological innovation with universal legal principles inspired by Roman law. This historical perspective provides a solid conceptual foundation for addressing current dilemmas of ethics and legality in auditing. From a practical standpoint, the justification lies in the fact that corporate transparency is not only a legal obligation but also a strategic factor for competitiveness and attracting investment. Assessing the role of AI in this process is essential for Guayaquil's economic development.

The study's contribution also relates to the need to propose recommendations that guide companies, auditors, and regulatory bodies in the responsible adoption of artificial intelligence. This involves designing policies that strengthen confidence in financial information. On the academic level, the research serves as a bridge between disciplines. Financial auditing, law, and artificial intelligence engage in dialogue within a comprehensive framework that enables the construction of new categories of analysis and sparks debates in indexed international forums.

This chapter is justified by its social relevance, as it seeks to ensure that citizens and economic actors trust that technology does not replace ethics and transparency but rather reinforces them under sound and universal legal principles. The overall objective of the research is to analyze the impact of artificial intelligence in financial auditing on corporate transparency in Guayaquil during the 2023–2024 period, from a legal perspective grounded in the principles of Roman law. Within this research, our specific objectives are: to identify the main benefits and risks of applying artificial intelligence in financial auditing; to examine the applicability of the principles of Roman law in current regulations; and to evaluate the degree of corporate transparency achieved through the implementation of AI.

The hypothesis posits that the implementation of artificial intelligence tools in financial auditing processes in Guayaquil between 2023 and 2024 has a significant positive impact on corporate transparency, provided there is a clear legal framework aligned with principles of Roman law such as good faith and liability. Recent studies have analyzed how the adoption of artificial intelligence in auditing improves both efficiency and fraud detection, although they caution that small businesses face technical, regulatory, and economic barriers. Likewise, evidence shows that AI can strengthen financial transparency and corporate governance, although it also introduces risks related to data privacy, algorithmic biases, and a lack of regulatory updates (Fachriyah & Anggraeni, 2024). Other studies have shown that investing in specialized AI talent improves audit quality in the long term, while ethical considerations remain central to trust in these systems (Favourate & Mpofu, 2023). Financial auditing has undergone a significant transformation in recent years due to the incorporation of emerging technologies, particularly the artificial intelligence (AI), which has redefined the processes of analysis, verification, and control of accounting information. This technological advancement has not only improved operational efficiency but has also redefined the way corporate transparency and accountability in the generation of financial information are conceived. In this context, recent literature shows that artificial intelligence enables the optimization of auditing processes by automating repetitive tasks, reducing human error, and improving fraud detection, although limitations have also been identified related to the technological gap between large and small organizations, as well as the absence of specific regulatory frameworks for its application in the financial sector (Fachriyah & Anggraeni, 2024).

Similarly, various studies have shown that the implementation of artificial intelligence in auditing strengthens corporate governance and financial transparency by improving internal controls and the quality of the reports issued. However, this technological progress also introduces significant challenges related to data privacy, algorithmic biases, and the need for constant updates to

regulatory frameworks (Shaban & Omoush, 2025). In this regard, the adoption of these tools cannot be understood solely from a technical perspective but requires a comprehensive analysis that incorporates ethical and legal dimensions.

The use of artificial intelligence in financial auditing also poses profound challenges in terms of process transparency and traceability, especially due to the inherent opacity of certain algorithms, which makes it difficult to understand how automated results are generated. Recent studies have shown that improving audit quality through AI depends not only on technology but also on the training of specialized professionals and the institutional capacity to adequately regulate these systems (Review of Accounting Studies, 2022). Likewise, trust in these systems depends largely on how algorithms are designed, implemented, and monitored, making ethics a central focus of the contemporary debate on digital auditing.

From a legal perspective, the debate is intensifying due to a lack of regulatory clarity regarding liability for errors or fraud generated or undetected by artificial intelligence systems, which raises questions about the allocation of responsibility among companies, auditors, and technology providers. This issue takes on particular relevance in contexts where regulation has not yet kept pace with technological innovation, creating legal loopholes that undermine the legal certainty of audit processes.

In this scenario, an analysis grounded in Roman law provides a fundamental conceptual framework, particularly through principles such as fides (good faith), liability, and equity, which constitute the historical foundation of transparency in economic relations. These principles remain relevant in the construction of contemporary legal systems and allow financial auditing to be interpreted as an extension of the duty of truthfulness, diligence, and trust in the economic sphere. Consequently, incorporating these principles helps establish an ethical and legal framework that contributes to mitigating the risks associated with automation, particularly those related to the loss of traceability and the excessive delegation of decisions to algorithmic systems.

In the context of Guayaquil, the implementation of artificial intelligence in financial auditing is in a phase of expansion, although it faces significant structural limitations. While companies have adopted these tools to improve the efficiency and accuracy of their processes, regulatory gaps persist that hinder their proper regulation. Added to this is the coexistence of traditional auditing systems and automated technologies, which creates operational, technical, and legal tensions within organizations. Furthermore, the lack of transparency in the algorithms used raises doubts about the reliability of the results, which can affect the confidence of investors, regulators, and other economic actors.

Based on this issue, this study aims to determine how the implementation of artificial intelligence in financial auditing influences corporate transparency in Guayaquil during the 2023–2024 period, using the principles of Roman law as the legal basis for analysis. In this regard, the hypothesis is that the implementation of artificial intelligence tools in financial auditing processes in Guayaquil during that period has a significant positive impact on corporate transparency, provided there is a clear legal framework aligned with principles of Roman law such as good faith, liability, and equity.

A review of the current state of the art reveals a growing trend toward the digitization of financial auditing through artificial intelligence, with results highlighting improvements in efficiency, a reduction in errors, and the strengthening of internal controls. However, significant challenges are also identified, including disparities in technology adoption, regulatory gaps, and ethical risks associated with the use of non-transparent algorithms. Overall, the literature agrees that

artificial intelligence has high transformative potential in financial auditing, but its effectiveness depends on the existence of robust regulatory frameworks, adequate technical capabilities, and clearly defined ethical principles.

Surveys administered to internal and external auditors and financial managers reveal a high level of adoption of AI tools in auditing. The majority of respondents (72%) indicate that the implementation of AI has reduced human errors and improved process efficiency. However, 28% report difficulties related to training and adapting legacy systems.

Table 1. *Level of AI Adoption in Auditing (Surveys)*

Adoption Level	Frequency	Percentage (%)
High	61	72
Medium	17	20
Low	7	8
Total	85	100

Note: Prepared by the authors

Most companies have adopted AI to a significant extent, supporting the hypothesis that its implementation positively influences audit efficiency and transparency. Semi-structured interviews reveal that AI contributes to transparency in financial reporting. Sixty-eight percent of respondents believe that automated systems make it possible to track each process and ensure traceability. However, challenges have been identified regarding the interpretation of results by less-trained auditors and the need for legal oversight.

Table 4. *Perceptions of Corporate Transparency (Interviews)*

Perception	Frequency	Percentage (%)
High	58	68
Medium	20	23
Low	7	9
Total	85	100

Note: Prepared by the authors

Analysis. AI improves the traceability and clarity of audit processes, although training and regulatory oversight need to be strengthened to ensure transparency.

An analysis of official audit documents and AI system logs shows that 71% of the reviewed processes meet criteria for traceability and data consistency. The logs indicate that most companies maintain control over the integrity of information and alignment with legal principles inspired by Roman law, such as good faith and liability.

Table 5. *Document Compliance and Traceability*

Compliance	Frequency	Percentage (%)
Complete	60	71
Partial	17	20
Inadequate	8	9
Total	85	100

Note: Prepared by the authors

Analysis. The findings from the literature review reinforce the results of surveys and interviews, demonstrating that AI contributes to transparency and reliability in financial auditing.

Taken together, the quantitative, qualitative, and documentary results show that the implementation of AI in financial auditing in Guayaquil (2023–2024) has a positive impact on corporate transparency. The benefits include reduced errors, process traceability, and alignment with legal principles. The main challenges relate to staff training, regulatory oversight, and technological adaptation aspects that must be addressed to maximize the effects of AI in auditing.

The results show that the implementation of artificial intelligence in financial auditing contributes significantly to corporate transparency in Guayaquil. The high level of adoption identified in the questionnaires reflects the global trend toward the digitization of accounting and auditing processes, consistent with Barroga's (2022) findings regarding the efficiency of automated systems.

The interviewees' positive perception regarding the traceability and reliability of information supports the hypothesis that AI can reinforce the principles of good faith and accountability, as suggested by the legal framework of Roman law adapted to the Ecuadorian context (Wasti et al., 2022). This demonstrates that technology and the law can converge to strengthen financial integrity. However, the results also highlight challenges, such as the need for ongoing training of auditors and supervisors to correctly interpret AI-generated results. This finding aligns with Schoonenboom (2023), who warns that technology alone does not guarantee transparency if it is not accompanied by human expertise.

The documentary analysis confirmed that most processes meet criteria for traceability and data consistency, which validates the quantitative and qualitative findings. This result highlights the importance of combining empirical data, stakeholder perceptions, and documentary evidence to draw robust conclusions (Data Gathering Instrument, 2024).

The integration of the findings demonstrates that AI not only improves operational efficiency but can also serve as a control and oversight tool, reducing the risks of fraud and human error. This aligns with recent studies highlighting the usefulness of automated tools in auditing to ensure the reliability of financial information (O'Connor, 2021).

Another relevant aspect is the relationship between AI and legal regulation. The results show that, although AI facilitates compliance with legal principles, regulatory gaps still exist that require attention, especially regarding the allocation of responsibility for system errors or failures.

In summary, the findings confirm that the implementation of AI in financial auditing has a positive impact on corporate transparency, but its effectiveness depends on adequate staff training,

regulatory oversight, and regulatory adaptation. The convergence of technology and Roman law provides a solid conceptual framework for assessing financial integrity.

Conclusion

Artificial intelligence serves as a strategic resource in financial auditing, as it enables the automation of processes, reduces errors, and enhances transparency in companies in Guayaquil during the 2023–2024 period.

The findings indicate that the adoption of AI improves the traceability of audit processes and facilitates the verification of compliance with legal principles such as good faith and accountability, which are fundamental to ensuring confidence in financial information.

The perceptions of auditors, managers, and regulators show that corporate transparency increases significantly when AI systems are implemented, provided that adequate controls and oversight are in place. Documentary evidence confirms that most of the audited processes meet consistency and traceability criteria, which validates the usefulness of AI as a tool for financial management and control.

Despite the benefits, challenges remain regarding staff training and the need for a clearer regulatory framework governing the application of AI in auditing, protecting companies and ensuring the integrity of information.

The combination of quantitative, qualitative, and documentary methods provided a comprehensive view of the impact of AI, demonstrating that the technology does not replace human oversight but rather complements it, thereby strengthening corporate governance. It is concluded that the integration of artificial intelligence into financial auditing, in conjunction with principles of Roman law, constitutes an effective strategy for improving corporate transparency, providing empirical evidence that can guide future corporate policies and regulations in Ecuador.

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The Roman Concept of Aequitas as a Foundation for the Debate on Gender Equality

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Introduction

Aequitas, as a principle linked to Roman legal reasoning, has traditionally been understood in relation to the need to adapt the application of the law to the particularities of specific cases. Its presence in the Roman legal tradition demonstrates that the law was not conceived exclusively as a rigid set of rules, but also as an interpretive practice in which justice, prudence, and consideration of the circumstances could play a role in determining the legally appropriate solution. In this sense, aequitas was linked to the pursuit of what was good and just in the application of the ius, taking on particular significance within jurisprudential activity and praetorian practice (Kuryłowicz, 2019; Santos, 2018).

The significance of this concept takes on a particular dimension when considering the tension between the generality of legal rules and the specific circumstances of the individuals subject to them. A rule formulated in general terms can produce different consequences when applied to situations characterized by unequal material, social, or legal conditions. Precisely for this reason, the legal tradition associated with *aequitas* is significant for understanding the role of those criteria designed to prevent the mechanical application of a provision from leading to a solution contrary to the purpose of justice that underpins the legal system. Roman legal doctrine has noted, in this regard, that *aequitas* played a significant role in the interpretation and practical application of the law, particularly through the work of jurists and the praetor (Kuryłowicz, 2019; Santos, 2018).

From this perspective, gender equality takes on central importance in contemporary discussions. Although current legal systems formally recognize equality and the prohibition of discrimination, experience shows that equality before the law is insufficient to overcome situations of structural disadvantage. Substantive equality seeks precisely to move beyond an exclusively formal understanding of equality by addressing the social conditions that generate subordination, disadvantage, or exclusion and ensuring that legal norms, policies, and practices contribute to transforming those conditions (Fredman, 2016). In this way, egalitarian justice shifts its focus away from the abstract formulation of identical rights and turns its attention to the concrete effects that legal institutions have on groups in different social positions.

From this perspective, the value of revisiting Roman *aequitas* lies in the opportunity it offers to examine the continuity of a fundamental legal concern, rather than in any potential direct transposition of ancient categories into contemporary law. Roman *aequitas* did not constitute a theory of gender equality in the contemporary sense, nor can it be interpreted in isolation from the hierarchical structures characteristic of Roman society. Nevertheless, its role within legal reasoning allows us to identify a historical precursor to the requirement of adapting the application of the law to the particularities of a specific case a requirement that takes on new

dimensions when examined through the contemporary categories of substantive equality and non-discrimination (Kuryłowicz, 2019; Santos, 2018; Fredman, 2016).

An analysis of this relationship therefore requires a starting point in Roman legal sources and the interpretations developed by its leading jurists. The formulations attributed to Ulpian, Paulus, and Gaius provide insight into how Roman legal thought constructed concepts related to justice, interpretation, and the application of the law. In particular, the Roman jurisprudential tradition demonstrates a concern for establishing legal solutions that responded to the characteristics of the cases under consideration, while praetorian activity constitutes one of the spheres in which *aequitas* acquired a practical dimension. Scholarly literature has specifically highlighted the importance of jurisprudence and praetorian law in shaping an equitable orientation within the Roman legal experience (Kuryłowicz, 2019; Santos, 2018).

However, any attempt to establish a link between *aequitas* and gender equality must critically consider the historical context in which that notion developed. Roman law was embedded in a society characterized by deeply hierarchical family, political, and property structures, within which women's legal status was conditioned by institutions such as the *tutela mulierum* and by the power relations inherent in the Roman family structure. The historical evolution of these institutions demonstrates, however, that women's legal status did not remain static and that certain restrictions were gradually weakened. Recent studies on tutela mulierum, for example, have shown the complexity of its evolution and the gradual transformation of women's legal independence at different stages of Roman law (Arjava, 2024).

This observation helps avoid an anachronistic interpretation of the concept of *aequitas*. The intention is not to assert that Roman jurists advocated for legal equality between women and men according to contemporary standards, nor that *aequitas* historically constituted an instrument designed to combat gender discrimination. The value of this analysis lies elsewhere: in determining how a legal category developed in a different historical context can provide arguments for understanding the evolution of the relationship between legal norms, justice, and specific circumstances. The research therefore begins with the premise that there is a fundamental historical difference between the original function of *aequitas* and today's demands for substantive equality, while also examining the points of contact that allow for a legal dialogue between these two experiences (Santos, 2018; Fredman, 2016).

This is where the central purpose of the chapter lies: to analyze the concept of *aequitas* in Roman law and examine its potential as a theoretical foundation for understanding the evolution toward contemporary conceptions of equity and substantive equality in gender matters. To this end, the study begins with the concept of *aequitas* in Roman legal practice, continues with an analysis of the legal status of women within that society, and then establishes a dialogue with contemporary conceptions of substantive equality. The aim is to identify elements of continuity in the function of " " a form of legal reasoning designed to address situations in which the abstract application of a rule may prove insufficient in light of the specific circumstances of the case, moving beyond any potential historical equivalence between institutions belonging to different eras (Kuryłowicz, 2019; Fredman, 2016).

The research is conducted using a historical-legal and doctrinal approach, based on a review of Roman legal sources and specialized scholarly literature on aequitas, justice, and the evolution of the legal status of women in Rome. This approach allows for combining the study of legal categories in their historical context with a critical examination of their potential relevance to contemporary issues. Therefore, this analysis proceeds in two directions: reconstructing the meaning of *aequitas* in Rome and examining how its interpretive and corrective function can be

understood in light of contemporary legal categories, without losing sight of the historical distances that separate the two periods (Santos, 2018; Kuryłowicz, 2019).

The hypothesis guiding this chapter argues that, although Roman *aequitas* emerged within a legal system that did not recognize gender equality as a universal legal principle, its function of adapting, interpreting, and tailoring the law to specific cases contains arguments that can help us understand the transition toward contemporary forms of substantive justice. From this perspective, *aequitas* is not presented as a historical solution to the problem of gender inequality, but rather as a category within the Roman legal tradition whose logic can be reconsidered in dialogue with current principles of equality, non-discrimination, and the correction of situations of structural disadvantage (Kuryłowicz, 2019; Fredman, 2016).

Understood in this way, the revival of aequitas allows us to build a bridge between the Roman legal tradition and contemporary transformations in the law. The value of this connection lies in recognizing that certain legal problems such as the tension between the generality of the law and the particular circumstances of individuals have historically accompanied legal thought, receiving different responses depending on each context, without this implying a mechanical transposition of a Roman category into the present. In the realm of gender equality, this perspective allows us to explore how the concern for a legally just application can engage with the contemporary demand to overcome merely formal inequalities and address the material conditions that produce disadvantage or discrimination (Santos, 2018; Fredman, 2016).

Consequently, the proposed analysis is grounded in a perspective that simultaneously recognizes the historical importance of Roman law and the need to interpret it critically in light of current legal challenges. Within this framework, *aequitas* serves as a starting point for examining the relationship between justice, interpretation, and adaptation of the law, while substantive equality provides the contemporary framework from which to reconsider that tradition. This approach allows us to reclaim the Roman legal legacy without ignoring its historical limitations and, at the same time, to explore its usefulness as an argumentative tool for conceiving of a legal system that is more attentive to the specific inequalities affecting individuals based on their gender (Kuryłowicz, 2019; Arjava, 2024; Fredman, 2016).

Aequitas in Roman Law

Understanding aequitas within Roman law requires situating it within the framework of a legal tradition characterized by the interaction between legal rules, judicial practice, and the specific circumstances in which the law was to be applied. The concept took on different nuances throughout the history of Roman law and was closely linked to the notions of justice, prudence, and the appropriateness of the legal solution. Its importance is particularly evident in the work of jurists and in the development of praetorian law areas in which the application of ius could incorporate criteria designed to respond more appropriately to the particularities of each situation. From this perspective, aequitas constitutes a fundamental category for understanding the adaptability that characterized the Roman legal system and its subsequent influence on European legal culture (Kuryłowicz, 2019; Santos, 2018).

Aequitas in the Sources and in the Thought of Roman Jurists

In Roman legal sources, aequitas appears linked to a conception of law oriented toward what is good, just, and reasonable. Ulpian's well-known formulation, *ius est ars boni et aequi*, situates law within a practice that combines technical knowledge with an assessment of what is just. This formulation takes on special importance when considering the role played by Roman jurists,

whose interpretive activity made it possible to develop legal responses to situations requiring a particular understanding of the circumstances. Roman jurisprudence thus constructed a framework for reasoning in which legal categories could be interpreted in light of their purpose and the demands of justice present in each case (Kuryłowicz, 2019).

The relationship between aequitas and iustitia allows for a more precise understanding of this dimension of Roman legal thought. Although both concepts are closely related, the specialized literature identifies differences in the way they were used by jurists. Iustitia could express a broader conception of justice as a guiding principle of legal relationships, while aequitas took on a dimension particularly linked to the weighing and balancing of the interests involved in specific situations. This relationship explains why aequitas could function as a criterion of legal reasoning capable of adapting the application of the law to the particularities of a case, while maintaining its connection to general principles of justice (Finkenauer, 2014; Kuryłowicz, 2019).

The historical development of aequitas also shows that its meaning did not remain static. Its use within Roman legal culture was linked to the evolution of institutions, the practice of magistrates, and the intellectual activity of jurists. Equity took on special relevance in the sphere of ius praetorium, where the praetor's intervention helped provide legal solutions tailored to the needs of a changing society. The interaction between civil law, praetorian activity, and case law generated mechanisms capable of incorporating new responses to problems that traditional ius civile did not always adequately resolve. In this process, aequitas functioned as one of the elements that fostered the Roman legal system's capacity for adaptation (Santos, 2018; Kuryłowicz, 2019)

This evolutionary dimension helps us understand the importance of aequitas as a legal category. The Roman experience demonstrates that the stability of a legal system also depends on its ability to respond to social transformations and specific situations through appropriate interpretive tools. Equity played a role in this process by providing criteria that allowed for the evaluation of legal solutions based on concrete circumstances and the purpose of the institutions. Scholarly literature has emphasized that aequitas was linked to auxiliary principles such as utilitas, analogy, prudentia, and fides elements that helped enrich Roman legal reasoning and endow it with a significant capacity for adaptation (Santos, 2018).

The Corrective Function of Aequitas in the Face of the Rigidity of the Rule

The function of aequitas takes on particular relevance when examining the relationship between the generality of the law and the specific circumstances of the case. Every legal rule necessarily possesses a certain degree of abstraction, since it must be formulated to address a variety of situations. Roman experience showed, however, that the application of the law required consideration of the particularities of the cases under adjudication. In this context, aequitas allowed for an assessment of the circumstances that favored an application of the law oriented toward the solution deemed just in the specific case. Roman law scholarship identifies precisely this capacity for adaptation as one of the fundamental features of equity within Roman legal reasoning (Rizzelli, 2022; Kuryłowicz, 2019).

The relationship between the general rule and the specific case can be observed with particular clarity in the rhetorical and legal tradition associated with the controversiae. In this context, aequitas could play a role in determining the appropriate solution when a general legal provision had to contend with particular circumstances that required a contextualized interpretation. Rizzelli (2022) explains that aequitas made it possible to adapt the ius understood as a general and abstract formulation produced by the lex to the individual circumstances of the specific

case. This characteristic is essential to understanding the legal function of equity: the rule retains its relevance as a general framework, while interpretation allows for determining its application by taking into account the specific conditions of the situation under examination.

The praetor's activities represent another significant manifestation of this capacity for adaptation. Through the *Edictum Praetoris* and the procedural instruments associated with his jurisdiction, Roman law developed mechanisms that made it possible to address situations that were not sufficiently protected by the traditional structures of the *ius civile*. The praetor's activities thus contributed to the formation of the *ius honorarium*, whose function was to assist, supplement, and correct civil law. Within this process, aequitas took on a practical dimension linked to the search for legally appropriate solutions to specific situations, thereby fostering the progressive evolution of the legal system (Kuryłowicz, 2019; Santos, 2018).

The importance of this corrective function must be understood within the logic of Roman law itself. Equity allowed legal application to incorporate elements related to the purpose of the rule, the nature of the situation, and the interests at stake. This process strengthened the legal system's ability to respond to new realities and contributed to the construction of legal solutions that would later be incorporated, developed, or reinterpreted by the European legal tradition. The historical reception of aequitas demonstrates, precisely, that its importance transcended the strictly Roman context and that its influence extended to later categories related to equity and to legal interpretation oriented toward justice (Kuryłowicz, 2019; Humphreys, 2023).

Aequitas, Interpretation, and Adaptation of the Law to the Specific Case

The interpretive dimension of aequitas allows for a deeper exploration of its relationship with the evolution of law. Roman legal interpretation was closely linked to the work of jurists, who developed solutions based on an analysis of sources, institutions, and specific circumstances. In this context, aequitas provided a criterion for assessing whether the application of a rule adequately served the intended legal purpose. The interpretive creativity of Roman jurisprudence was one of the factors that explains the legal system's capacity for transformation and its adaptation to a society characterized by significant political, economic, and social changes (Kuryłowicz, 2019).

The adaptation of the law to the specific case can also be observed in the way Roman jurists related the rule to broader principles of legal reasoning. Aequitas was accompanied by criteria such as prudentia, fides, analogy, and consideration of utility, forming a set of tools that allowed for the construction of solutions tailored to the circumstances. Santos (2018) emphasizes that these elements contributed to the complexity of classical legal reasoning and allowed equity to play a significant role in both the development and application of the law. Thus, aequitas can be understood as part of a broader legal methodology aimed at harmonizing the general rule with the particularities of social reality.

This capacity for adaptation is particularly significant when analyzing the relationship between aequitas and legal evolution. A legal system that possesses interpretive mechanisms capable of responding to new circumstances can develop progressive solutions without completely abandoning the continuity of its fundamental categories. The Roman experience offers a historical example of this dynamic: the transformations brought about through case law and praetorian activity made it possible to incorporate legal responses linked to new social needs. Aequitas played a role in this process as a criterion of reasoning and as an expression of a conception of law open to consideration of specific circumstances (Santos, 2018; Rizzelli, 2022).

From this perspective, aequitas becomes relevant to the central issue of this chapter because it introduces a dimension of law that is particularly sensitive to the differences between the situations subject to regulation. Legal equality formulated in abstract terms may require an interpretation that takes into account the specific conditions of individuals and the power dynamics present in each situation. This characteristic allows for the establishment of a conceptual connection with the contemporary evolution of substantive equality, which pays attention to structural disadvantages and material conditions that may prevent formal equality from producing legally just outcomes (Fredman, 2016). The link is thus built on a shared concern for the relationship between the general formulation of the law and the actual circumstances in which its effects occur.

The comparison gains greater depth when one considers that contemporary equity can also play a role in recognizing relevant differences between people and situations that formally appear similar. Fredman (2016) proposes a multidimensional conception of substantive equality that encompasses the correction of disadvantages, the elimination of stereotypes and stigmas, participation, and the transformation of the structures that produce inequality. This conception helps us understand that legal justice requires addressing the social conditions in which relationships between people unfold. Within this framework, the focus on the specific case a hallmark of aequitas offers a useful conceptual precedent for reflecting on the need to interpret norms while considering the circumstances that may produce differentiated effects.

The connection between Roman aequitas and contemporary substantive equality must therefore be situated within the realm of legal argumentation. The Roman concept provides a historical reference regarding the possibility of reconciling the generality of the rule with the particularity of circumstances, while contemporary substantive equality incorporates this concern within a legal framework aimed at overcoming situations of structural disadvantage. The continuity lies in the search for legal criteria capable of responding to concrete reality; the historical difference lies in the values, subjects, and objectives that each legal system recognizes. This interpretation allows us to reclaim the Roman legal tradition from a critical perspective and project it toward the current challenges of justice and equality (Humphreys, 2023; Fredman, 2016).

Aequitas thus constitutes a key element for understanding the transformative capacity of the Roman legal tradition. Its presence in case law and in the praetorian judiciary demonstrates that the development of law could occur through processes of interpretation, adaptation, and the construction of solutions tied to specific circumstances. This characteristic explains part of the subsequent influence of the Roman legal tradition on European legal culture and helps us understand why equity continues to be a relevant category for contemporary legal thought. Recovering this historical dimension lays the groundwork for analyzing the legal status of women in Rome and allows us to subsequently examine how a category developed within a hierarchical society can be critically reinterpreted in light of current demands for gender equality (Kuryłowicz, 2019; Humphreys, 2023).

Gender Inequality in Roman Law

The analysis of aequitas takes on a particular dimension when viewed within the social and legal context in which it developed. Roman society was organized through family and legal structures that assigned different positions and capacities to men and women. Institutions such as patria potestas, the manus, and tutela mulierum reflected a legal framework in which women's autonomy was conditioned by relationships of authority. This historical framework is essential for understanding the limits of the concept of aequitas in its original context and for avoiding

interpretations that impose contemporary categories of gender equality on Roman law (Pérez Pérez, 2017; Arjava, 2024).

The legal status of women, however, underwent significant transformations throughout Roman history. The differences between the Archaic period, the Republic, the Principate, and Late Antiquity show that women's legal and property rights did not remain static. The gradual weakening of institutions such as the tutela mulierum, together with the expansion of certain opportunities for property management, demonstrates an evolution in the law that allowed greater autonomy for many women. Arjava (2024) shows that female tutela gradually weakened from the Principate onward until it eventually disappeared a process that must be interpreted within the broader context of the evolution of women's legal and economic independence in the Roman world.

Tutela mulierum constitutes a particularly significant example of this transformation. During certain historical periods, women sui iuris were subject to tutela, which entailed the intervention of a guardian in specific legal acts. Over time, the practical effectiveness of this institution diminished considerably, and mechanisms were developed that expanded women's capacity to administer property and participate in property-related matters. Historical research shows that the legal reality of women ( ) was more complex than a simple dichotomy between legal incapacity and full autonomy, as formal restrictions coexisted with growing spheres of economic and property-related activity (Arjava, 2024).

Women's participation in property matters constitutes another important element for understanding this evolution. Research on Roman law has demonstrated that women could be involved in matters related to property, inheritance, dowry, and the administration of assets, although their specific opportunities depended on factors such as the historical period, marital status, social standing, and family circumstances. Riggsby (2010) highlights that women could inherit and dispose of property under certain circumstances, while studies on legal practice reveal a broader scope of female participation than might be inferred solely from institutions of familial subordination. This reality demonstrates the coexistence of restrictive legal structures with effective spheres of female agency.

The complexity of this legal position is particularly relevant to the argument of this chapter. The evolution of Roman law demonstrates that legal categories could progressively modify their effects as social conditions and legal practices changed. The weakening of tutela, the expansion of patrimonial autonomy, and the transformation of family relationships are examples of a historical process in which the law responded to new realities through institutional and interpretive modifications. This dynamic allows us to situate aequitas within a legal tradition characterized by the progressive adaptation of the law and provides a historical precedent for subsequently examining its relationship with contemporary demands for substantive equality (Arjava, 2024; Pérez Pérez, 2017).

Taking these changes into account is essential for a contemporary understanding of Roman law. Historical study reveals that legal institutions do not produce identical effects in all periods or for all people, as their application depends on social conditions and the evolution of the legal categories themselves. In the case of Roman women, the gap between normative restrictions and actual spheres of action demonstrates that women's legal status must be analyzed by considering both formal rules and their practical application. This approach is consistent with a conception of law that emphasizes the specific case and the circumstances in which norms take effect an aspect closely related to the historical function of aequitas (Kuryłowicz, 2019; Arjava, 2024).

The evolution of women's legal status ultimately allows us to move toward the central question of this chapter: the possibility of interpreting aequitas as a historical category capable of engaging with contemporary conceptions of substantive justice. Roman law offers a context in which legal transformation occurred through the interaction of norms, institutions, case law, and social practices. Contemporary gender equality incorporates broader legal demands linked to the elimination of structural disadvantages and the transformation of the conditions that perpetuate subordination. The relationship between these two levels can be explored through the function of equity as a criterion that allows for the assessment of the application of the law in light of specific circumstances and the goal of justice pursued by the legal system (Fredman, 2016; Humphreys, 2023).

Aequitas as a Tool for Substantive Justice

The historical evolution of aequitas helps us understand its importance as a legal category linked to the search for solutions tailored to specific circumstances. Its function within the Roman legal tradition was related to the ability to interpret and apply the law in light of the particularities of each situation, especially when the general nature of a rule required a more precise assessment of its effects. This characteristic takes on special significance when viewed from the contemporary perspective of substantive equality, whose legal development has highlighted that formal equality requires mechanisms capable of addressing the actual conditions in which social and legal relationships occur (Kuryłowicz, 2019; Fredman, 2016).

Substantive equality is based on an understanding of equality that takes into account the material, social, and institutional conditions that can lead to situations of disadvantage. In this conception, legal equality is linked to the possibility of correcting disadvantages, challenging stereotypes and discriminatory practices, promoting participation, and transforming structures that reproduce inequalities. Fredman (2016) proposes precisely a multidimensional understanding of substantive equality that integrates these elements and allows for an analysis of the law based on its concrete effects on individuals. This perspective is particularly relevant to gender, given that historical inequalities can persist even within legal systems that formally recognize equality between women and men.

The relationship between formal equality and substantive equality has also gained significance in the judicial interpretation of fundamental rights. Comparative experience shows that certain courts have progressively developed criteria aimed at considering the context, the impact of legal norms, and the conditions of inequality existing among the groups involved. Albertyn (2007) identifies this evolution in South African constitutional jurisprudence, where substantive equality has been used as a tool to address social and economic inequalities through an interpretation that is sensitive to the context and the effects of legal decisions. This development illustrates how equality can take on a transformative dimension when legal analysis incorporates the specific conditions under which a law operates.

Comparative experience in the area of gender discrimination also demonstrates the importance of moving beyond an exclusively formal application of the principle of equality. The analysis of Nigerian case law conducted by Durojaye and Owoeye (2017) highlights the difficulties that arise when constitutional protection against discrimination is interpreted primarily through the lens of formal equality. Their study argues that a substantive approach allows for a clearer identification of the historical disadvantages affecting women and provides legal tools to address forms of discrimination that may remain invisible when only the formal treatment accorded to individuals is compared. This experience demonstrates the relevance of a legal interpretation that is attentive to the context and consequences of legal norms.

Within this framework, Roman aequitas can be examined as a conceptual precursor to a legal concern that later took on new forms: the need for the application of the law to consider the specific circumstances in which a rule takes effect. The comparison requires addressing the historical differences between the two concepts, but it also allows us to recognize a continuity in the use of legal criteria aimed at adapting the legal solution to the characteristics of the case. n aequitas provided, within Roman law, a mechanism of reasoning linked to justice in the specific case, whereas contemporary substantive equality develops tools designed to address structural disadvantages and inequalities through the law (Kuryłowicz, 2019; Fredman, 2016).

This relationship takes on particular relevance in the context of gender because situations of inequality can arise through seemingly neutral norms. A provision that establishes equal treatment for all individuals can produce differential consequences when those subject to it start from different social conditions. The contemporary concept of indirect discrimination has made it possible to identify precisely these situations and to examine the effects of certain rules or practices beyond their formal wording. De Vos (2020) shows that the evolution of European antidiscrimination law has progressively incorporated substantive dimensions that allow for the assessment of both direct discrimination and the differential effects that certain rules may produce in practice.

Taking context into account is therefore an essential element of substantive justice. A legal decision may require an assessment of social, economic, family, or cultural factors that affect the specific circumstances of the individuals involved. In matters of gender, this approach allows us to recognize that inequalities may be linked to stereotypes, the unequal distribution of responsibilities, violence, economic dependence, or exclusion from certain spaces of participation. Fredman (2016) incorporates precisely these dimensions into her proposal for substantive equality, highlighting the importance of simultaneously addressing disadvantage, stereotypes, participation, and structural transformation.

Aequitas thus acquires argumentative value within the dialogue between legal tradition and contemporary law. Its historical function demonstrates that the application of law can incorporate criteria designed to assess the specific circumstances of a case and to reach a legally appropriate solution. This characteristic allows for a connection to be established with contemporary methodologies of interpretation aimed at identifying the differential effects of legal norms and correcting situations of disadvantage. This connection is particularly significant for gender equality, as it allows us to understand legal justice as an activity that requires consideration of the specific conditions under which people exercise their rights (Santos, 2018; Fredman, 2016).

Attention to the Specific Case as an Element of Legal Justice

Attention to the specific case is one of the elements that allows us to understand the contemporary manifestation of aequitas. In Roman law, equity played a role in constructing solutions that took into account the particularities of the legal relationships subject to adjudication. Judicial and praetorian practice allowed for the development of mechanisms through which general categories could be applied in a manner better suited to specific circumstances. This characteristic is documented in Roman law literature as part of the process through which aequitas contributed to the adaptation of the law and the development of legal solutions linked to the needs of Roman society (Santos, 2018; Kuryłowicz, 2019).

The assessment of the specific case also plays an important role in contemporary conceptions of equality. When a situation of discrimination is analyzed solely through the abstract formulation of the law, the historical and social conditions that explain the position of the affected individuals

may be overlooked . Substantive equality introduces precisely this contextual perspective, which allows us to assess how norms interact with preexisting social structures. Albertyn (2007) points out that context, impact, and consideration of differences are key elements in developing a transformative conception of equality, particularly when addressing inequalities that have a structural dimension.

This contextual dimension helps us understand why legal equality does not always imply uniform treatment. Certain differences may be legally relevant when they reflect conditions that disproportionately affect the effective exercise of rights. Substantive equality acknowledges this reality through mechanisms such as the prohibition of indirect discrimination, affirmative action, and reasonable accommodation measures, the purpose of which is to address situations of disadvantage that formally identical treatment may perpetuate. Barnard and Hepple (2000) identified this evolution in European equality law early on, highlighting the gradual shift from a strictly formal conception of non-discrimination toward approaches linked to substantive equality and equity.

Attention to differences takes on particular importance when legal norms are applied in contexts characterized by historical relationships of subordination. In these scenarios, the analysis of equality requires examining the position that individuals occupy within the social structure and the effects that a given regulation has on them. Comparative constitutional jurisprudence has developed various mechanisms to address these situations, incorporating criteria related to disadvantage, stereotypes, and the impact of legal measures. Fredman (2016) explains that these elements form part of a conception of substantive equality aimed at ensuring that the law responds to the needs of those in positions of disadvantage, exclusion, or subordination.

From this perspective, the specific case becomes a space in which the general principles of law take on practical significance. The law provides a framework, while interpretation determines its scope in relation to specific circumstances. In Roman law, aequitas contributed to this task through legal reasoning aimed at tailoring the solution to the case; in contemporary law, substantive equality develops tools that make it possible to assess the consequences of legal norms on historically disadvantaged groups. Both dimensions can be analyzed together as historically distinct expressions of a concern for achieving legal solutions compatible with the justice of the case (Kuryłowicz, 2019; Fredman, 2016).

Aequitas and the Correction of Situations of Inequality

The corrective function of aequitas allows for a deeper exploration of its relationship to contemporary issues of discrimination. In Roman practice, equity could help make the application of legal categories more flexible when specific circumstances demanded a different solution. The development of praetorian law constitutes a significant manifestation of this dynamic, as it allowed for the incorporation of procedural mechanisms and remedies capable of addressing situations that required specific legal protection. The scholarly literature identifies this capacity for adaptation as one of the factors explaining the historical importance of aequitas within the evolution of Roman law (Santos, 2018; Kuryłowicz, 2019).

In contemporary law, the corrective function of substantive equality is manifested through instruments designed to address situations of historical disadvantage. Affirmative action measures, the prohibition of indirect discrimination, protection against stereotypes, and certain forms of accommodation constitute mechanisms through which legal systems can respond to inequalities that require specific legal intervention. Fredman (2016) integrates these dimensions

into a broad conception of substantive equality that seeks to correct disadvantages and modify structural conditions that affect certain groups differently.

Gender is a particularly significant area for this corrective function. Inequalities between women and men have historically been linked to social, family, economic, and political structures that can be reproduced through seemingly neutral norms. The evolution of antidiscrimination law has led to the recognition that equality requires analyzing both the content of laws and their effects. Durojaye and Owoeye (2017), in studying the judicial interpretation of gender discrimination in Nigeria, demonstrate the importance of adopting a substantive perspective capable of identifying historical inequalities and directing legal protection toward their actual consequences.

The corrective dimension of equality also becomes relevant in the interpretation of laws that establish differences based on gender. Contemporary judicial analysis must assess whether the differentiation pursues a legitimate purpose, whether there is an appropriate relationship between the measure and the objective pursued, and whether its effects are compatible with the principle of equality. In this process, taking context into account makes it possible to identify situations in which a formal distinction may reproduce stereotypes or exacerbate preexisting inequalities. De Vos (2020) documents how European case law has progressively developed a more substantive approach to the principle of non-discrimination, particularly through its treatment of indirect discrimination.

The revival of aequitas from this perspective helps strengthen the dialogue between the Roman law tradition and contemporary legal categories. The historical function of equity shows that Roman law developed mechanisms to adapt the application of rules to the particularities of legal relationships. Substantive equality, for its part, incorporates a contemporary concern for the material and structural conditions that determine the effective exercise of rights. The link between these two levels allows us to understand equity as a legal category that, throughout different historical periods, has accompanied the search for solutions capable of harmonizing the generality of the law with the concrete demands of justice (Kuryłowicz, 2019; Fredman, 2016).

From Formal Equity to Substantive Gender Equality

The transition toward substantive equality represents a significant shift in how we understand the relationship between equality and law. Formal equality focuses primarily on the requirement to grant equivalent legal treatment to those in comparable situations. Substantive equality broadens this perspective by examining the conditions that determine the actual possibilities for exercising rights and participating in social life. Fredman (2016) explains that this conception incorporates dimensions related to correcting disadvantages, eliminating stereotypes, strengthening participation, and structural transformation.

This evolution helps us understand that gender equality requires addressing both the norms and the social structures within which they operate. Differences in access to the labor market, the distribution of family responsibilities, political participation, gender-based violence, and other social phenomena may be linked to historical patterns that go beyond the individual formulation of a legal rule. In this sense, substantive equality provides a framework for analyzing the interaction between law and social structures, ensuring that norms contribute to reducing the conditions that produce disadvantage (Fredman, 2016; Albertyn, 2007).

Comparative case law shows that this conception has influenced the interpretation of equality rights. Courts have progressively developed tools to assess the context, the effects of legal norms, and the social conditions of the affected groups. De Vos (2020) identifies this evolution

in European Union law, where certain judicial decisions have incorporated substantive dimensions into the interpretation of non-discrimination. This process highlights the transformation of the principle of equality from a perspective focused exclusively on formal comparison to one that attaches increasing importance to the impact of laws and the circumstances of the individuals involved.

The same trend can be observed in other constitutional systems. Albertyn (2007) shows that substantive equality can function as a legal tool aimed at social transformation when courts consider the context and effects of decisions on historically disadvantaged groups. In matters of gender, this perspective allows for the recognition that certain differences in treatment may require specific analysis due to the historical structures that have shaped women's position. The law thus takes on an active role in identifying and correcting the conditions that perpetuate inequality.

Within this process, aequitas provides a particularly significant historical reference point. Its function within Roman law was linked to the pursuit of an application of the law appropriate to the circumstances of the case and to the evolution of legal solutions through the work of jurists and magistrates. Contemporary substantive equality addresses a different and broader concern, yet it preserves the relevance of a fundamental legal idea: justice requires consideration of the concrete reality in which the law produces its effects. This relationship allows us to understand aequitas as a historical category open to reinterpretation in light of current demands for social justice and gender equality (Santos, 2018; Fredman, 2016).

The contemporary interpretation of aequitas gains greater substance when understood as an argumentative tool. Its value lies in providing a point of reference within the legal tradition to explain the importance of adapting the application of the law to circumstances that a strictly abstract formulation may not sufficiently address. From the perspective of gender equality, this approach promotes a legal interpretation that is attentive to historical disadvantages, stereotypes, and the differential effects of legal norms. The Roman tradition thus brings a historical dimension to the contemporary debate on equity, while the theory of substantive equality provides the conceptual tools for interpreting current inequalities (Kuryłowicz, 2019; Fredman, 2016).

Understanding contemporary inequalities also requires an approach grounded in research into social realities and in the production of knowledge capable of identifying the conditions that shape them. Advances in social research provide insights that help us recognize that legal and social inequalities must be studied with due regard for the specific characteristics of the contexts in which they manifest (Barros & Bores, 2024). Professional training takes on special importance when addressing issues related to inclusion and equality, as it requires knowledge and tools that enable one to recognize the differences that exist among individuals and to understand the conditions that can lead to situations of disadvantage (Cárdenas-Palomino et al., 2024).

These contributions help strengthen the connection between legal tradition and current demands for justice. Research provides insights for identifying the inequalities that manifest in social reality, while education helps develop the capacity to understand and respond to them. From this perspective, aequitas remains relevant as a historical reference point for legal reasoning attuned to specific circumstances. Its adaptive function can be understood, in the contemporary context, in dialogue with a conception of equality that recognizes the importance of examining the actual conditions under which legal norms produce their effects. Thus, the Romanist tradition can be applied to current debates on gender equality without losing sight of the historical differences between Roman law and contemporary legal systems.

Contemporary Applications: From the Past to the Present

The relevance of equity can be observed in various areas of contemporary law where the application of general principles must address situations characterized by material inequalities. In matters of gender, this issue takes on particular significance in the face of forms of discrimination that may arise directly or indirectly. The evolution of antidiscrimination law demonstrates that the effective protection of equality requires mechanisms capable of identifying the differential effects of certain rules and practices, particularly when they affect historically disadvantaged groups (De Vos, 2020; Durojaye & Owoeye, 2017).

The workplace is one of the areas where this evolution is particularly visible. Differences related to access to employment, pay, family responsibilities, and opportunities for promotion have driven the development of legal mechanisms aimed at ensuring effective equality. An analysis of substantive equality allows for an assessment of these situations based on the structural conditions that may influence workers' positions, rather than solely on the existence of a rule that is formally identical for everyone. Barnard and Hepple (2000) show that the evolution of European equality law has progressively incorporated mechanisms designed to address these situations through categories such as indirect discrimination and affirmative action.

Protection against gender-based discrimination also requires addressing the stereotypes that can influence the interpretation and application of the law. Substantive equality recognizes that certain cultural patterns can affect people's autonomy, participation, and legal recognition. Fredman (2016) incorporates the elimination of stereotypes, prejudices, and violence as one of the central dimensions of his proposal, which helps us understand that legal equality also has a transformative dimension related to the social structures that produce subordination.

Judicial proceedings also constitute important venues for observing this transformation. Court decisions can help clarify the scope of the principle of equality and determine when a difference in treatment is legally relevant. Research on comparative jurisprudence shows that courts have developed different methodologies for assessing gender-based differences and their effects on the individuals affected. Durojaye and Owoeye (2017) demonstrate, for example, that the choice between a formal and a substantive interpretation of equality can significantly alter the law's ability to address situations of gender discrimination.

The European experience also offers insights into the evolution of judicial interpretation of equality. De Vos (2020) identifies a gradual incorporation of substantive dimensions into the case law of the Court of Justice of the European Union, particularly regarding direct and indirect discrimination. This evolution demonstrates that general principles of equality acquire practical meaning through judicial interpretation and that their scope can change as legal systems recognize new forms of inequality. This phenomenon is linked to the historical tradition of aequitas, understood as a category associated with the adaptation of the law to specific circumstances.

A historical comparison thus allows us to recognize a line of continuity in the argumentative function of equity. In Roman law, aequitas played a role in the construction of legal solutions tailored to the case and contributed to the progressive development of the law through jurisprudential and praetorian activity. In contemporary law, substantive equality employs legal principles and techniques aimed at addressing situations of disadvantage and discrimination. These categories belong to different historical contexts, but analyzing them together helps us understand the importance of considering specific circumstances within legal reasoning (Kuryłowicz, 2019; Fredman, 2016).

This perspective also allows us to understand the Romanist tradition as one open to reinterpretation. The revival of aequitas for the contemporary debate on gender requires recognizing the patriarchal context in which it developed and, simultaneously, examining its function as a criterion for legal adaptation. The tradition can take on new meanings when its categories are studied in light of later legal issues and subjected to a historical and critical reading. In this sense, aequitas provides a starting point for reflecting on the law's capacity to respond to specific situations and on the role of legal principles in constructing solutions compatible with the demands of justice in each era (Santos, 2018; Fredman, 2016).

The relationship between aequitas and gender equality ultimately allows us to observe how an ancient legal category can contribute to the understanding of contemporary legal problems without losing its historical specificity. Roman equity brings the dimension of adapting the law to the specific case; substantive equality brings a contemporary conception aimed at correcting disadvantages, challenging stereotypes, strengthening participation, and promoting structural transformations. The dialogue between these two categories enriches our historical understanding of the Roman legal tradition and, at the same time, strengthens contemporary legal discourse centered on effective justice and gender equality (Kuryłowicz, 2019; Fredman, 2016).

Conclusion

The analysis presented here allows us to understand aequitas as a fundamental category for interpreting the adaptability of Roman law to the particularities of specific cases ( ). Its presence in case law and praetorian practice facilitated the development of legal solutions tailored to the specific circumstances of the relationships subject to regulation, contributing to the progressive development of the legal system and the consolidation of a legal tradition oriented toward the articulation between law, justice, and social reality.

A study of women's legal status demonstrates that Roman society was characterized by hierarchical family and social structures, although it also underwent transformations that progressively expanded certain areas of women's legal and property autonomy. This evolution highlights the historical capacity of the law to modify its institutions as social conditions changed an aspect that is relevant for understanding the relationship between legal tradition and transformation.

A comparison with contemporary substantive equality reveals a space for dialogue between these two experiences. Aequitas emphasizes consideration of the specific case and the adaptation of the legal solution, while substantive equality incorporates an analysis of disadvantages, stereotypes, participation, and the structures that reproduce inequality. This relationship provides a theoretical foundation for reinterpreting the Roman legal tradition in light of current challenges related to gender equality.

Consequently, the revival of aequitas helps strengthen the dialogue between history and legal theory, demonstrating how a classical category can become relevant for reflecting on contemporary forms of justice. Its study contributes to an understanding of the evolution of legal reasoning and offers a historical perspective for addressing the construction of a legal system that is more attentive to specific circumstances and the demands of substantive equality.

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The Adoption of "Common Law" Practices and the Civilizational Regression of Societies

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Introduction

The coexistence of the major Western legal traditions has given rise to an ongoing debate regarding their epistemological foundations, their methods of reasoning, and their impact on the shaping of contemporary societies. Among these traditions, Roman law and common law represent profoundly distinct legal models, both in their historical origins and in their methods of producing, interpreting, and applying the law (Jalil, 2017).

While the Roman law tradition is characterized by a strong tendency toward conceptual abstraction, normative systematization, and dogmatic construction, the common law has historically developed on the basis of case-by-case solutions, judicial precedents, and reasoning techniques linked to concrete experience. This methodological divergence raises important questions regarding legal rationality, regulatory certainty, and the ability of the different systems to provide coherent responses to the challenges facing contemporary societies.

This chapter critically examines the historical and conceptual evolution of both legal traditions, beginning with their respective origins and analyzing their main structural characteristics. It also explores the influence of Roman law on the formation of Western legal science, the development of case law as a specialized form of rationality, and the tensions arising from the growing incorporation of common law concepts into legal systems of the civil law tradition.

Such approaches also align with current trends in higher education oriented toward the internationalization of knowledge, methodological innovation, and the consolidation of educational approaches based on critical thinking elements that foster the development of historical, comparative, and multidisciplinary legal research (Cárdenas-Palomino et al., 2024). From a historical-comparative perspective, it is argued that Roman law constitutes not only a historical precursor to contemporary legal systems but also a genuine conceptual framework capable of providing high levels of coherence, universality, and systematicity to legal thought.

In line with current trends in scholarly production within the social sciences, historical-legal and comparative analysis allows for a broader understanding of normative phenomena from interdisciplinary perspectives, thereby fostering the construction of interpretive frameworks capable of engaging with the contemporary challenges of university research and globalized knowledge (Barros & Bores, 2024). In this regard, the proposed analysis seeks to contribute to reflection on the current processes of transformation in Western legal culture and on the role that the Romanist tradition continues to play in the construction of models of legal rationality for the 21st century.

Roman Origins and the Origins of the Common Law

A comparison between the Roman-Germanic legal tradition and the common law system requires beginning with an element that is often underestimated in comparative studies: the historical dimension of the process by which both models were constructed. The evolution of a legal system depends not only on the quality of its contemporary institutions but also on the length of time during which those institutions have been subject to continuous processes of doctrinal development, jurisprudential interpretation, and conceptual refinement. From this perspective, the Roman-rooted legal tradition possesses an exceptional historical advantage, the result of more than two millennia of virtually uninterrupted intellectual development.

If one accepts the traditional date of Rome's founding set by Titus Livius at 753 B.C. it can be said that Roman law constitutes one of the oldest cultural manifestations of Western civilization. During this extensive historical process, law ceased to be a mere technique for resolving conflicts and became a true normative science, endowed with its own categories, general principles, and rational methods of interpretation. No other Western legal tradition has undergone a historical development comparable to Roman law in terms of both duration and conceptual depth. This explains why a large part of the fundamental institutions of contemporary law property, obligations, contracts, inheritance, civil liability, and possession still find their foundations today in concepts developed by Roman jurists (Stein, 1999).

In contrast, the generally accepted historical foundations of the common law emerged many centuries later. Although earlier Germanic precursors can be identified, the consolidation of the English system is usually dated to after the Norman Conquest of 1066 and, above all, through the organization of the Royal Courts during the 12th and 13th centuries. Even if one takes the issuance of the Magna Carta in 1215 as a starting point, the chronological gap between the two systems remains extraordinary. This implies that while English law was beginning to structure its first judicial institutions, Roman law had already passed through all its major stages of evolution: archaic law, pre-classical law, classical law, post-classical law, and the great Justinian Code, whose influence would subsequently shape the entire European legal culture (Zimmermann, 1996).

This temporal difference is not merely a historiographical curiosity. Time, in fact, represents a decisive factor in the consolidation of any legal tradition. Each generation of jurists inherits the results of the intellectual work of those who preceded them, refines their categories, corrects their shortcomings, and transmits progressively more refined knowledge. From this perspective, the enormous chronological gap between the two systems also entails a cumulative difference in legal experience. While Roman law was able to slowly construct an extraordinarily sophisticated conceptual framework, common law evolved primarily through successive judicial responses to specific problems, without initially developing a comparable general system.

Precisely for this reason, numerous scholars of comparative law have emphasized that the main strength of Roman law lies not solely in the antiquity of its institutions, but in the extraordinary intellectual continuity of its tradition. Even after the political demise of the Western Roman Empire, the study of the Corpus Iuris Civilis remained alive throughout the Middle Ages thanks to the work of the glossators and commentators at the University of Bologna. Subsequently, legal humanism, the School of Natural Law, and German Pandectism continued to develop Roman legal categories until they became the scientific foundation of nineteenth-century European codification (Wieacker, 1995).

Consequently, when the major European civil codes began to be drafted during the 18th and 19th centuries, their drafters did not start from a new legal reality, but rather from a body of legal doctrine built up over approximately two thousand years. The French Civil Code of 1804, the German Bürgerliches Gesetzbuch of 1900, the Italian Codice Civile of 1942, and a large portion of the Latin American codes are modern manifestations of a much older legal tradition, whose conceptual coherence derives directly from the Roman experience (Gordley, 2014).

The situation was different in the evolution of the common law. Its historical development was closely linked to the functioning of the English royal courts and to the gradual consolidation of judicial precedent as the primary source of law. The construction of the system relied much more on the practical resolution of disputes than on the elaboration of general dogmatic categories. This characteristic explains why numerous authors describe the common law as an essentially case-law-based legal system, where rules arise primarily from accumulated judicial experience rather than from the abstract formulation of general principles (Glenn, 2014).

This does not mean, of course, that either system lacks rationality or that their respective evolutions have been linear. Both represent different historical responses to similar problems. However, the greater historical depth of Roman law produced a conceptual systematization that is difficult to compare with any other Western legal tradition. Many of the categories currently used in modern legal scholarship legal transaction, obligation, estate, possession, liability, representation, nullity, among many others were originally formulated within that tradition and continue to structure contemporary legal thought even when legal practitioners are no longer fully aware of their Roman origins.

From a cultural perspective, this continuity helps us understand that Roman law is not merely a historical precursor to civil law, but a genuine form of legal thought. Its endurance over more than twenty centuries demonstrates an extraordinary capacity to adapt to profoundly diverse political, economic, and social contexts. This flexibility explains why institutions originating in ancient Rome continue to be used in current civil codes and still provide useful solutions to contemporary legal problems.

For this reason, the chronological difference between Roman law and common law takes on a significance that transcends mere historical fact. The accumulation of legal experience is an essential element in assessing the maturity of any legal system. The longer a tradition has been subject to critical reflection, doctrinal discussion, and conceptual refinement, the greater its potential to offer stable, coherent, and systematic solutions to social problems. From this perspective, the historical advantage of Roman law cannot be understood solely as a matter of antiquity, but rather as the manifestation of a prolonged civilizational process whose legacy continues to shape contemporary legal culture.

Reason and Nature at the Origin of Legal Systems

One of the aspects that most clearly distinguishes the Roman-civil law tradition from the common law lies in the epistemological foundation upon which both systems built their respective models of legal production. While Roman law progressively evolved into a rational system of abstract categories and general principles, Anglo-Saxon law developed primarily through the practical resolution of specific disputes. This methodological difference is not merely a technical matter; rather, it reflects two distinct ways of understanding the legal phenomenon, the function of the judge, and the role of legal science within the organization of society.

Roscoe Pound expressly acknowledged this difference when he stated that “the strength of the common law lies in the handling of specific disputes, whereas the strength of its rival, modern

Roman law, lies in the logical development of abstract concepts" (Pound, 1921). This characterization has also been highlighted by contemporary comparative legal scholarship, which identifies the systematic construction of law through general categories and abstract principles as a distinctive feature of the civil law tradition (Smits, 2015).

This observation is particularly significant because it comes precisely from one of the most important representatives of American legal scholarship. The statement acknowledges that both systems arrive at effective legal solutions through profoundly different intellectual paths: one draws on accumulated judicial experience; the other, on the rational elaboration of general categories capable of guiding the resolution of multiple specific situations.

Indeed, the rationality characteristic of Roman law cannot be understood apart from the cultural context in which it developed. Rome inherited a considerable portion of the Greek philosophical legacy, especially from the rational tradition inaugurated by Plato and Aristotle. Although it would be incorrect to argue that Roman legal institutions were a mere application of Aristotelian logic, it is equally undeniable that the intellectual environment of the classical Mediterranean fostered the development of a deeply systematic legal thought. The influence of philosophy enabled Roman jurists to gradually begin distinguishing between concepts, principles, institutions, and rules, thereby constructing a true science of law long before medieval universities existed (Du Plessis, 2013).

This rationality made it possible to overcome the limitations inherent in any purely casuistic regulation. Legal solutions ceased to depend exclusively on the particular circumstances of a dispute and instead became concrete manifestations of previously developed general principles. In other words, legal reasoning began to develop from the universal toward the particular, allowing a single conceptual category to be applied to a potentially unlimited number of similar situations. This process explains why numerous Roman institutions have remained in force for more than two thousand years: they were not constructed to resolve a specific conflict, but rather to express permanent structures of legal reasoning.

In this sense, the Roman legal tradition can be understood as one of the first successful attempts to rationally systematize human coexistence through relatively stable legal categories. The creation of concepts such as obligatio, possessio, dominium, bona fides, culpa, and dolus allowed the law to transcend specific historical circumstances and become a universal technical language. It is precisely this capacity for abstraction that constitutes one of the main factors explaining the subsequent extraordinary spread of Roman law throughout Europe and, later, in Latin America.

By contrast, the initial development of the common law responded to a different historical reality. As Pound also observes, the English system emerged against a backdrop composed of Germanic institutions, local customs, and primitive forms of the administration of justice. Its evolution was shaped by day-to-day judicial practice and by the immediate need to resolve specific conflicts rather than by the deliberate construction of a general dogmatic framework. Consequently, the system's rationality emerged gradually as a result of the accumulation of judicial precedents rather than through prior conceptual systematization.

This methodological difference can be seen even when analyzing the earliest historical descriptions of the Germanic peoples by Roman authors. Tacitus, in his work *Germania*, describes a political organization based on tribal assemblies where matters of greatest importance were resolved collectively and where the administration of justice appeared to be closely linked to the customs of each community. Decisions did not stem from previously

formulated abstract legal principles, but rather from social practices passed down through tradition and legitimized by group consensus (Tacitus, 1919).

Julius Caesar offers a similar description in *Commentaries on the Gallic War*. According to his account, the Germanic peoples lacked permanent magistracies during times of peace, and the administration of justice was limited to the local chiefs of each community. The judicial function was thus closely linked to immediate political authority and the specific needs of each community, with no clear distinction yet existing between political power, custom, and law. This circumstance contrasts sharply with the institutional complexity that Roman law had already attained during the Republic (Gaius, 1975).

By the time Rome came into contact with these peoples, the Roman legal system had already undergone several centuries of doctrinal evolution. The pontiffs had developed sophisticated interpretive techniques; the praetor's activities had considerably enriched the system through the creation of the ius honorarium; and the great Republican jurists were beginning to construct a legal science based on general concepts. A historical comparison reveals that both systems started from very different levels of intellectual development, a circumstance that explains many of the methodological differences still observable today between the continental and Anglo-Saxon traditions.

However, acknowledging this historical difference does not mean ignoring the extraordinary capacity for evolution that the common law would later demonstrate. Over the following centuries, especially beginning with the works of William Blackstone in the 18th century, English legal doctrine undertook significant efforts at systematization that partially brought the two models closer together. Nevertheless, even these attempts preserved the fundamental characteristic of the Anglo-Saxon system: the methodological priority of the specific case over the abstract construction of general categories. While continental law continued to develop codes and systematic doctrines, the common law continued to place its primary trust in the accumulated experience of the courts.

From a comparative perspective, this methodological divergence has significant consequences for the stability of legal systems (Glenn, 2014). Abstract reasoning facilitates legal predictability, allows new situations to be integrated into existing categories, and promotes the coherence of the legal system. For its part, reasoning that is eminently case-specific offers a remarkable capacity to adapt to unprecedented problems, albeit at the cost of greater dependence on judicial discretion. Both models have advantages and limitations; however, the Roman-civil law tradition has historically demonstrated a particularly remarkable capacity to construct organic, coherent, and conceptually stable legal systems, which is why it continues to form the foundation of most contemporary civil law systems.

Consequently, the opposition between reason and experience should not be understood as a mere academic difference, but rather as a genuine divergence in the way law is conceived. While Roman law aspires to establish universal principles capable of guiding the resolution of numerous future conflicts, the common law prioritizes the progressive development of solutions derived from accumulated judicial experience. It is precisely on this methodological difference that many of the other divergences that still distinguish these two major legal families are built.

The Origin of the Idea of Jurisprudence

The historical development of jurisprudence constitutes one of Roman law's most significant contributions to Western legal culture. The contemporary notion of jurisprudence as an intellectual activity aimed at interpreting, systematizing, and developing the law has its roots in

the progressive evolution of Roman legal science. Consequently, a comparative analysis of Roman law and common law cannot be limited solely to the study of their formal sources but must also consider how both systems understood the role of the jurist and the creative function of legal interpretation.

In this context, it is appropriate to distinguish between two different historical periods. The first corresponds to the emergence of the praetorian magistracy during the Roman Republic; the second, to the consolidation of classical jurisprudence as a true science of law. Both phenomena constitute complementary stages in the process of rationalizing the Roman legal system and help explain why judicial law-making often considered a characteristic exclusive to the common law actually has clearly identifiable antecedents within the Roman legal tradition.

The creation of the praetorship is generally dated to 367 B.C., through the Leges Liciniae Sextiae, in a context marked by political tensions between patricians and plebeians. From an institutional perspective, the office of praetor initially responded to the need to alleviate the judicial duties of the consuls. However, its historical significance far exceeded that administrative purpose. The authority granted to the praetor to organize legal proceedings and grant legal remedies ultimately became one of the main driving forces behind the evolution of Roman law, allowing the ius civile to be progressively adapted to the new economic and social demands of the Republic.

As Theodor Mommsen noted, the praetorship represented one of the most innovative institutions of republican constitutionalism, precisely because it allowed the law to evolve without the need to continually alter existing legislative norms. Through the praetorian edict, the magistrate introduced solutions designed to correct, supplement, or remedy the shortcomings of the ius civile, giving rise to what is known as the ius honorarium. This technique made it possible to maintain the formal stability of the legal system while facilitating its adaptation to an increasingly complex economic reality (Mommsen, 2024).

From a methodological perspective, the praetor's activity constitutes one of the earliest historical examples of judicial law-making. Although the magistrate did not legislate in the strict sense, his decisions ultimately established relatively stable criteria that decisively influenced the resolution of subsequent disputes. In this regard, an interesting similarity can be identified with the role currently played by judges within common law systems. Both models attribute to the court an active role in the development of the law, even though the institutional foundations that legitimize that activity are different.

However, the analogy should not lead to equating the two phenomena. While the case law-based development characteristic of the common law rests primarily on the binding force of judicial precedent (stare decisis), the development of the ius honorarium remained embedded within a much broader normative structure, dominated by general categories and previously established principles. The praetor's creativity did not entail replacing the existing legal system, but rather ensuring its adaptation without disrupting the conceptual coherence of the legal order as a whole (Du Plessis, 2018).

The subsequent evolution of Roman law further deepened this process through the extraordinary development of classical jurisprudence. Between the 1st and 3rd centuries CE, the work of the great Roman jurists reached an unprecedented level of intellectual sophistication. Figures such as Labeo, Sabinus, Julianus, Gaius, Paulus, Ulpian, Papinian, and Modestinus developed a scientific methodology based on the rational interpretation of legal institutions, establishing conceptual categories whose influence remains evident in contemporary private law (Du Plessis, 2018).

The importance of these jurists did not lie solely in the specific solutions they proposed for particular disputes. Their true contribution lay in transforming legal reflection into an autonomous discipline, distinct from philosophy, politics, and religion. The Roman jurist ceased to be limited to a practical knowledge of the rules and became a true legal scholar, capable of constructing general concepts, identifying common principles, and formulating systematic solutions applicable to diverse situations.

This transformation can be clearly seen in the well-known passage from Pomponius's *Enchiridion*, preserved in the *Digest* (D. 1.2.2), which describes the historical process through which Roman law evolved from primitive customs to the consolidation of a true legal science.

Pomponius's account constitutes one of the most important historical testimonies for understanding the birth of Western jurisprudence and the gradual specialization of legal knowledge as an autonomous discipline.

The Justinian compilation of the sixth century definitively consolidated this process.

The Digest is not merely a collection of legal rules, but an extraordinary compilation of the thought developed by successive generations of jurists. Unlike other legislative sources of antiquity, the authority of the Digest rests precisely on the scholarly quality of the reasoning contained in its passages. This explains why, throughout the Middle Ages, the legal Renaissance, and modern codification, the study of the Corpus Iuris Civilis continued to be regarded as the quintessential model of systematic legal reasoning (Iso, 2002).

From the perspective of comparative law, it is particularly significant to note that many of the methodological ideals currently pursued by Anglo-Saxon jurisprudence had already been developed by Roman jurists many centuries earlier. Systematic interpretation, analogical reasoning, the harmonization of seemingly contradictory principles, and the search for solutions compatible with equity are common techniques found within the Justinian Digest. The difference lies in the fact that Roman jurists integrated these tools into a previously developed conceptual system, whereas in the common law they continue to appear primarily in connection with the progressive development of judicial precedent.

Consequently, it can be argued that the true innovation of Roman law did not consist solely in creating enduring legal institutions, but in having conceived a specific form of legal rationality based on the scientific analysis of law. Case law thus ceased to be a mere accumulation of decisions and became an intellectual activity aimed at discovering the internal coherence of the legal system. It is precisely this scientific conception of law that constitutes one of Rome's principal legacies to the continental legal tradition and remains one of the distinctive elements of Romanist legal culture (Du Plessis, 2018; Zimmermann, 1996).

The Abstract versus the Concrete

The opposition between abstract and concrete thinking is one of the central elements for understanding the methodological differences between Roman law and the common law. Beyond the classic distinction between codified and case-law-based systems lies a deeper divergence related to the very way of conceiving legal reasoning, the function of legal rules, and the process of constructing legal knowledge.

Roscoe Pound identified this dichotomy by noting that common law finds its primary strength in the resolution of specific disputes, whereas the Roman-civil law tradition is characterized by the logical development of abstract concepts. This assertion helps us understand that both models

are based on distinct intellectual methodologies, each of which pursues different objectives within the organization of the legal system (Pound, 1921).

In the Roman-Germanic system, abstraction is an essential tool for ensuring the coherence and stability of the law. The formulation of general categories makes it possible to group similar situations under common principles, reducing the need to devise specific solutions for each new dispute. The creation of abstract legal concepts is therefore not merely a dogmatic exercise, but rather a technique designed to rationalize legal experience and facilitate the predictability of decisions.

This capacity for abstraction was one of the most outstanding characteristics of classical Roman jurisprudence. Roman jurists succeeded in constructing a set of conceptual categories broad enough to transcend the specific historical contexts in which they arose. Institutions such as obligation, possession, representation, fault, or good faith have retained remarkable relevance precisely because they were conceived from a systematic and general perspective, capable of adapting to changing social realities without losing their essential conceptual structure (Zimmermann, 1996).

The use of abstract categories offers significant advantages from a methodological standpoint. First, it considerably reduces the margin of uncertainty associated with judicial activity. The judge does not need to reconstruct the law in every particular dispute, but rather to identify the previously established legal principle or institution that is applicable to the specific case. Second, it promotes uniformity in judicial decisions by providing common criteria for interpretation that can be used by different legal practitioners. Finally, it facilitates the teaching and transmission of legal knowledge by organizing the legal system around systematic and relatively stable concepts. These differences have been extensively studied by contemporary comparative legal scholarship, which highlights the importance of legal methodologies in the construction of coherent and functional normative models (Palmer, 2005).

In contrast, the eminently concrete approach characteristic of the common law places considerably greater trust in the accumulated experience of the courts. The resolution of conflicts is constructed progressively through comparison with previous precedents, which requires the judge to identify similarities and differences between specific factual situations. The legal rule thus emerges from judicial practice and acquires legitimacy primarily through the repetition of mutually consistent decisions.

This method has undeniable advantages in terms of flexibility. The absence of excessively rigid categories allows for a rapid response to new economic, social, and technological realities. The law can evolve gradually through successive adjustments in case law, without necessarily depending on legislative reforms or complex codification processes (Glenn, 2014). However, this adaptive capacity can also generate higher levels of uncertainty, especially when available precedents are contradictory or when factual differences between cases make it difficult to identify uniform criteria.

From a hermeneutic perspective, reliance on judicial decisions also poses challenges related to the subjectivity of the judge. To the extent that legal reasoning is constructed primarily on the basis of concrete experiences, the potential influence of individual, cultural, or contextual factors on decision-making increases. Legal interpretation is thus more closely linked to the judge's life experience and his or her particular perception of justice, a circumstance that can affect the predictability and stability of the system.

The Roman-civil law tradition, by contrast, has historically sought to minimize this subjective dimension by developing general principles and abstract categories. Obviously, no legal system

can completely eliminate judicial discretion; however, the existence of well-established dogmatic structures allows for more precise limits to be set on interpretive activity and reduces the possibility of excessively divergent solutions to similar problems (Smits, 2015).

Nevertheless, it would be incorrect to present both models as absolutely incompatible categories. The contemporary evolution of legal systems demonstrates a growing convergence between the two traditions. Continental systems have progressively increased the importance of constitutional jurisprudence and judicial precedents, while Anglo-Saxon countries have developed increasingly sophisticated mechanisms for doctrinal systematization. A certain methodological convergence can therefore be observed, although significant differences remain regarding the relative weight attributed to abstract norms and judicial experience (Cortés and Lodder, 2014).

In the Latin American context, this phenomenon takes on particular significance. The growing constitutionalization of the law and the strengthening of judicial review of constitutionality have favored the incorporation of argumentative techniques similar to those of the common law. However, these transformations have not entailed the abandonment of the Roman-Germanic model, but rather the coexistence of jurisprudential mechanisms with the dogmatic structures characteristic of the civil law tradition. The question, therefore, lies in determining to what extent this convergence contributes to enriching legal systems or, conversely, may generate tensions regarding the conceptual coherence that has historically characterized continental law.

From this perspective, the debate between abstraction and concreteness remains one of the main challenges of contemporary comparative law. Historical experience shows that Roman law's ability to formulate general categories has been one of the decisive factors in its extraordinary longevity. The ability to integrate new social realities into previously developed concepts explains why many Roman institutions remain fully operational after more than two thousand years of legal evolution. This circumstance is likely one of the most evident manifestations of the effectiveness of abstract reasoning as an instrument for constructing and preserving legal rationality (Gordley, 2013).

Roman Law as the Organic and Conceptual Framework for All Law

It should be added that the thousands of years of Roman legal thought constitute the organic and conceptual framework of all contemporary law, regardless of the legal tradition to which it belongs. Indeed, the extraordinary adaptability demonstrated by Roman law throughout its historical evolution allowed for the consolidation of legal categories that have survived profound political, economic, and social transformations, remaining in force to this day. Numerous fundamental institutions of modern private law such as property, possession, obligations, liability, contracts, and inheritance have their immediate roots in concepts developed by Roman jurists, who succeeded in devising conceptual models characterized by a remarkable degree of abstraction and universality (Stein, 1999).

Indeed, if we consider that the Romans created a specialized intellectual sphere distinct from morality, philosophy, and logic specifically intended to define the scope of the legal realm, it is possible to assert that they laid the foundations for a true science of law. This intellectual effort led to the formation of an organic system of categories, principles, and interpretive techniques that continues to provide the conceptual language used by much of contemporary legal scholarship. This explains why, even in legal systems far removed from the classical Romanist tradition, it is possible to identify argumentative structures that correspond to patterns of thought initially developed within the Roman legal tradition (Zimmermann, 1996).

Roman law must therefore be understood not only as a set of historical norms belonging to a vanished civilization, but also as a methodology of legal reasoning that has transcended the temporal limits of its original context. The persistence of its dogmatic categories constitutes one of the most significant phenomena in Western cultural history, insofar as it demonstrates the existence of certain recurring legal problems for which Roman solutions have retained a remarkable explanatory power. This historical continuity supports the argument that Roman law continues to play a structuring role within modern legal thought, acting as a conceptual framework shared by numerous legal traditions (Schiavone, 2012).

From this perspective, it can be argued that the traditional opposition between civil law and common law systems does not necessarily imply the existence of completely autonomous legal universes. On the contrary, both traditions share a common intellectual heritage that refers, directly or indirectly, to the Roman experience. Even where judicial precedent constitutes the primary formal source of law, concepts, categories, and methods of argumentation persist whose genealogy can be traced back to classical Roman law or to its medieval and modern reinterpretations.

In this regard, various authors have pointed out that the influence of Roman law extends far beyond the realm of private law, extending to disciplines as diverse as constitutional law, administrative law, international law, and general legal theory. This expansive reach stems from the extraordinary sophistication achieved by Roman jurists in the development of general legal concepts, which can be reinterpreted and adapted to profoundly different historical contexts. The flexibility inherent in these constructs explains, to a large extent, the persistence of the Romanist tradition as an indispensable methodological reference for the study of contemporary legal institutions (Mousourakis, 2015).

Likewise, the historical development of the European ius commune demonstrates that Roman law functioned for centuries as a true legal language shared among different political and cultural communities. During the Middle Ages and the Early Modern Period, the reception of the Corpus Iuris Civilis enabled the construction of a common legal culture that transcended state borders and fostered the development of a legal science characterized by high levels of systematicity. This phenomenon constitutes one of the most significant precursors to current processes of legislative harmonization and supranational legal integration.

Nor did the consolidation of civil codification in the 18th and 19th centuries signify a radical break with the Romanist tradition. Quite the contrary: the major European codifications incorporated a significant portion of the conceptual categories developed over centuries by Romanist doctrine, adapting them to the new demands arising from political and economic modernity. Thus, it can be asserted that Roman law remains present not only in the content of numerous legal institutions but also in the modes of reasoning employed by judges, legislators, and scholars to understand and interpret them.

Consequently, viewing Roman law as the organic and conceptual framework for all law is not merely a historical assertion, but rather the recognition of a methodological reality that remains valid today. The enduring nature of its categories, its ability to articulate abstract solutions to concrete problems, and its influence on the various Western legal traditions support the claim that the Roman legacy remains one of the fundamental pillars of contemporary legal rationality.

The Anglo-Saxon Invasion

Over the past few decades, various Latin American countries have undergone profound constitutional transformations that have reinforced the centrality of fundamental rights and the

normative force of constitutions. This process has been accompanied by a growing expansion of judicial review of constitutionality and by greater importance attributed to constitutional jurisprudence as a source of normative production. From a perspective focused on the protection of human rights, such developments can be considered largely positive, insofar as they promote the effective protection of individual and collective guarantees (Ferrajoli, 2011). However, these transformations have also had indirect effects on the legal culture of the Romanist tradition, particularly with regard to methods of reasoning and the sources of law.

In this context, a gradual incorporation of categories characteristic of the common law can be observed, not only at the procedural level but also in the way the legal phenomenon is understood as a whole. The growing authority accorded to judicial precedents, the expansion of doctrines based on casuistic reasoning, and the tendency to prioritize solutions derived from specific disputes are phenomena that reveal a certain convergence toward models traditionally characteristic of Anglo-Saxon law. This phenomenon has been described by comparative legal scholars as a process of the circulation of legal models and the transfer of institutions between historically distinct systems (Glenn, 2014).

From the perspective of continental legal traditions, this situation has sometimes been interpreted as a form of "legal acculturation," a term used by various European legal comparatists to describe the gradual adoption of external institutions that ultimately alter the conceptual structures inherent to a given legal system. In the Latin American context, this influence is particularly evident in the growing importance attributed to constitutional jurisprudence as a primary mechanism for legal innovation a phenomenon that alters the traditional relationships between legislation, legal doctrine, and judicial decisions (Samuel, 2014).

However, it should be noted that this shift toward forms of reasoning characteristic of the common law does not necessarily imply a complete replacement of the Romanist tradition. In many Latin American countries, there remains a strong adherence to the principles of legality, codification, and systematicity elements that continue to shape the fundamental identity of their legal systems. Rather, there appears to be a coexistence of techniques drawn from different traditions, giving rise to hybrid models whose evolution is still underway.

However, from the perspective advocated in this paper, the growing reliance on case-by-case solutions may pose certain risks to the internal coherence of legal systems in the civil law tradition. Excessive reliance on judicial creativity and the development of law through case law could lead to situations of legal uncertainty, undermining the advantages associated with predictability and stability that have traditionally characterized codified systems. The historical strength of the Romanist model has consisted precisely in the development of general categories capable of offering relatively uniform solutions to a multitude of specific situations.

In this sense, the gradual shift toward frameworks dominated by the logic of precedent could be interpreted as a profound change in traditional modes of legal rationality. The judge ceases to be merely an interpreter of abstract norms and increasingly becomes a direct producer of normative criteria applicable to future cases. While this phenomenon may contribute to greater adaptability of the law in the face of new social challenges, it also poses significant challenges in terms of democratic legitimacy, legal certainty, and doctrinal consistency (Merryman & Pérez-Perdomo, 2019).

The influence of global trends is equally significant in this process. The internationalization of law, the expansion of multilevel constitutionalism, and the consolidation of international human rights protection systems have fostered greater circulation of jurisprudential arguments among

different legal systems. As a result, the traditional distinction between civil law and common law is becoming increasingly blurred, creating spaces for methodological convergence that transform the classical categories of comparative law (Mattei, 1997).

Nevertheless, even while acknowledging these dynamics of convergence, it can be argued that the Romanist legal tradition retains significant advantages stemming from its high degree of conceptual systematization. The ability to draw upon general principles, abstract categories, and well-established dogmatic constructs constitutes a distinguishing feature that continues to offer important tools for addressing contemporary challenges in law. In this sense, the so-called "Anglo-Saxon invasion" could be understood not so much as a definitive replacement of the Romanist paradigm, but rather as a permanent tension between different historical forms of legal rationality.

Conclusions

In light of the considerations outlined in the preceding sections, it is possible to argue that the comparison between the Roman legal tradition and the common law goes beyond a mere opposition between distinct legal families, extending to different ways of conceiving legal rationality, the production of norms, and the very function of law in the organization of social life. From this perspective, historical analysis demonstrates that Roman law is not merely a distant precursor of contemporary private law, but a genuine intellectual model for the systematic construction of legal knowledge.

The extraordinary historical continuity of Roman law, its ability to adapt to profoundly diverse political and economic contexts, and the enduring nature of its fundamental categories allow us to affirm that we are dealing with one of the most sophisticated cultural products produced by Western civilization. The gradual consolidation of abstract concepts, general principles, and complex interpretive techniques enabled the development of a legal system endowed with remarkable internal coherence, capable of transcending historical contingencies and offering stable solutions to recurring problems of human coexistence (Stein, 1999).

In contrast, the common law developed historically from a predominantly casuistic logic, closely linked to the resolution of specific disputes and the gradual accumulation of judicial precedents. This does not mean disregarding the contributions made by this legal tradition, particularly in areas related to interpretive flexibility, the protection of rights, and the capacity to adapt to new social realities. However, from the perspective advocated here, it is evident that the epistemological foundations of the Roman law model offer greater levels of systematicity, predictability, and conceptual rationalization.

The contemporary expansion of techniques characteristic of the common law into legal systems of the continental tradition especially through the growing importance attributed to constitutional jurisprudence raises significant questions about the future evolution of Western legal culture. While these processes can be interpreted as manifestations of convergence between different legal traditions, they also raise legitimate concerns regarding the preservation of the structural elements that have historically characterized codified systems.

Indeed, the increasing centrality accorded to judicial precedent and the tendency to prioritize solutions derived from specific cases may lead to a certain fragmentation of legal discourse, weakening the unifying role traditionally played by general principles and by the systematic categories developed over centuries of doctrinal reflection. The historical strength of Roman law has lain precisely in its ability to provide a conceptual framework broad enough to organize the

complexity of social relations through relatively stable and universalizable legal instruments (Zimmermann, 1996).

In this sense, the uncritical reception of Anglo-Saxon models could be interpreted as a phenomenon of cultural transformation that affects not only the sources of law but also the predominant forms of legal thought in certain societies. The so-called "Anglo-Saxon invasion" is, therefore, a phenomenon that must be analyzed from a historical and methodological perspective, taking into account both its potential benefits and its possible effects on the legal identity of systems belonging to the Romanist tradition.

Nevertheless, the enduring nature of the Roman legacy demonstrates that great intellectual constructs transcend political cycles and academic fads. Roman law has survived the fall of the Empire, medieval fragmentation, modern codification, and the transformations stemming from contemporary constitutionalism. This extraordinary capacity for survival seems to confirm the insight expressed by Goethe in his well-known metaphor of the duck that momentarily disappears beneath the water only to reappear shortly thereafter with full vitality. Similarly, Roman law continues to resurface in many areas of contemporary legal thought, even where its influence is not fully recognized.

In short, considering the historical accumulation of legal experience, the methodological refinement achieved by Roman jurisprudence, and the capacity for abstraction developed by the Romanist tradition, it can be argued that a significant qualitative difference persists between the legal model built upon the conceptual rationality of Roman law and that based predominantly on the casuistic experience characteristic of the common law. From this perspective, the shift toward models of reasoning that are overly dependent on judicial precedent could be interpreted as a reduction in the degree of systematicity achieved by Western legal science.

Consequently, and without disregarding the contributions made by contemporary constitutionalism and by new trends in global law, it can be concluded that the preservation of the conceptual categories inherited from Roman law remains an essential condition for maintaining the levels of coherence, rationality, and universality that have historically distinguished the continental legal tradition. More than a mere historical vindication, this assertion constitutes an invitation to critically reconsider the current transformations in law and to assess the role that the Romanist tradition can continue to play in constructing appropriate legal responses to the challenges of the 21st century.

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The Universality of Roman Law and the Harmonization of Latin American Law: Brief Considerations

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Introduction

The topic we intend to address must be analyzed within the context of efforts to develop a uniform or harmonious body of law concerning, primarily, obligations and contracts; a common legal framework for peoples located in a similar geographic and cultural area, whose legal systems exhibit a convergence of conceptual elements, methods, and techniques for applying the law. The thesis underlying the argument we intend to develop is that Roman law, just as it did in the past, could once again serve as a unifying element among legal cultures that may appear to be diverse and distant. Is it possible for Roman law to become a renewed ius commune in the 21st century?

A historical analysis of the Roman legal system which reached its zenith with Emperor Justinian's codification indicates that it is an open system capable of adapting to culturally diverse realities and those separated by time, through the tireless work of jurists who interpret and renew its precepts (ius commune, usus modernus pandectarum).

The development of the Roman system has as its starting point Justinian's *Corpus Iuris Civilis*, which, as A. SACCOCCIO, had already envisioned that his codification thanks to the tireless work of jurists in continually renewing and adapting it was destined to "remain valid forever, without spatial or temporal limits (in omne aevum valituras), in principle for all peoples who inhabited or would inhabit the globe" (Saccoccio, A. 2019).

S. SCHIPANI argues that we must re-examine the ancient sources, paying attention to the "principium" of all things, as Gaius states in D. 1.2.1, or at least bear in mind their role as a source of information for the Roman legal system. In fact, the plurality of laws is brought together into a unified whole through the work of jurists (Pomponius, *lib. singulari Enchridii*, D. 1.2.2.2: *leges sine ordine latas in unum componere*); the plurality of autonomous sources law, custom, the praetor's edict, and the opinions of jurists is united through the work of jurists (Pomponius, individual books of the Enchridii, D. 1.2.2.13: "the law cannot be established unless there is some expert in law through whom it may be improved day by day"); the plurality consisting of ius civile, ius gentium, and ius naturale (Ulpian, Book I of the Institutions, D. 1.1.1.2) is brought together into a unity within the "system" of common Roman law. It is these pluralities which remain as such yet are recomposed into unity that emerge with this dual perspective in the Roman legal texts from the period when the system was taking shape, enabling them to engage with reality without prejudice, to avoid asymmetries, and to restore the subtlety and resilience of the system's internal coherence across its various levels and within its universalist openness (Schipani, et al. 2015).

Among historians, there has been extensive debate over whether the Early Middle Ages marked the end of the ancient world or the beginning of a new era, and the prevailing perception has often been that continuity prevailed over rupture. In reality, every era is a time of transition, and undoubtedly the disappearance of the political and administrative organization of the Roman Empire in the West did not entail the elimination of the models of exercising and administering power that had been used in the empire's final phase. The feudal organization that took hold in Europe with its rites and customs of vassalage, the agrarian contracts governing the cultivation

of the land, the " " or charismatic character attributed to the sovereign, the consolidation of the principle of the personality of the law, and with it the introduction of customs of Germanic origin which, in turn, conveyed legal concepts foreign to the ancient world are phenomena that can be detected, in embryonic form, as early as the final phase of the empire. These phenomena were factors that disrupted the order and mindset that had fostered the formation of the empire and Roman law; over time, these factors gave rise to an almost complete transformation of society, while nevertheless remaining the vectors of continuity that continued to produce effects. Medieval society and order exhibited characteristics quite different from those of the ancient world, which never ceased to exert a genuine fascination on medieval minds; the need to build anew upon the Roman experience became increasingly pressing, as those who invoked Rome sought a renovatio (Sacco, R. 1996)

The process of forming the ius commune, thanks in part to the contribution of canonists, began with the scholarly studies of the Corpus Iuris Civilis, conducted in Bologna starting in the 11th century by Irnerius. The analysis of Justinian's codification would continue through the 18th century, in a constant effort to adapt the legal frameworks of Justinian's law through refined hermeneutic processes to ever-changing social needs.

The birth of modern legal science (characterized by the adoption of the logical-dogmatic method) can be dated to the 12th century, since it was during this century that Justinian's compilation, the *Corpus Iuris Civilis* of the 6th century A.D., regained a central position in legal studies, becoming a common subject of study for European jurists and establishing itself as the definitive model of European law and the primary object of analysis for Western jurists until the 19th century. Various factors contributed to the revival of studies of the Corpus Iuris Civilis, among which the resurgence of trade in the 10th century coinciding with the consolidation of imperial power in Germany during the reign of Otto I was certainly significant. This process was accentuated by migratory flows toward urban centers after the year 1000, where new farming techniques were developed, and the monetary economy was strengthened by the revival of craft industries and maritime trade. On the political front, the corrosive force of feudalism and the serious issues linked to the fragmentation of the Carolingian Empire necessitated the search for a new element of cohesion a unifying force capable of counteracting the centrifugal forces that defended particularism. Two factors facilitated the normative unification of the heterogeneous legal landscape that characterized Europe at the time: the universalist doctrine of the Church, introduced by Gelasius (Brato, 1999), and the ethical-political conception of the Holy Roman Empire, which was also characterized by a strong universalism. The idea of Rome would have become merely a political expedient, a propaganda tool to be used to strengthen and legitimize imperial power, had it not been for the need to take Roman legal and political institutions as a model; from this new perspective, the idea of Rome took on a specific meaning and gradually ceased to be a purely propagandistic element, leading to the "practical reception" of Roman law. The phenomenon of the reception of Roman law, however, would not have come about without the contribution of jurists who, after several centuries, returned to the scientific study of law (Maruotti, L. 2011)

Although the medieval Empire exhibited characteristics entirely different from those of the Roman Empire, the idea took hold that the ancient Roman Empire had been reborn and that its political power had been transferred to the new emperors (translatio imperii). In this context, the books of the Corpus Iuris, rediscovered in Italy, gave rise to the idea that this was the law of the new empires (Hespanha, 2012).

Legal culture between the 16th and 18th centuries was characterized, on the one hand, by the legal tradition of the doctors who, building upon the *Corpus Iuris Civilis*, refined the *ius

commune* scholastic law , shaped in the universities and courts where learned jurists practiced, by local customs, and by a growing body of royal legislation; on the other hand, by the emergence of natural law, which proposed a new foundation, a new order, and a new way of reasoning about law. The system of natural law provided natural reason as the ultimate justification for laws: anything contrary to natural reason had to be eliminated from the laws. Tradition and custom alone could not justify the rules. Legal thought was also influenced by the Enlightenment, which, in the name of reason, challenged tradition, religion, superstition, and the legalistic subtleties of jurists; if human reason is universal, and if anyone can exercise their own reason, then the law must take the form of principles that are clear, evident, and understandable to all (Lopes, et al., 2009).

Against this backdrop, the codification movement gained strength: the law would guarantee the validity of the principles of natural law, founded on the natural reason common to all human beings. Codification would create order and certainty. The codes, however, would become a reality with the strengthening of nation-states, through the positivization of law via legislation, and through the legislative will of a sovereign. The first codes appeared as early as the second half of the 18th century: the Bavarian civil and criminal codes between 1752 and 1756; the Austrian codification in 1786 and 1811; and the Prussian General Code in 1794.

Codifications

In 1804, the Napoleonic Code came into force in France. This event, as N. BOBBIO explains, was fundamental and had far-reaching repercussions, exerting a profound influence on the development of modern and contemporary legal thought. It can be said that there are two codifications that had a fundamental influence on the development of Western legal culture, especially with regard to civil law systems: the codification of Justinian and that of Napoleon. The development of Roman common law in the Middle Ages and the Modern Era was based on the work of Justinian; the Napoleonic Code had a considerable influence on legislation and legal thought over the last two centuries, given that the codes of various countries were modeled after it (Bobbio, 1995).

A segment of contemporary legal scholarship views the codification movement as a break with common law, insofar as codes constitute the instrument through which the bourgeois state seeks to monopolize the creation of law, reserving for itself the authority to apply it.

This position is refuted by S. SCHIPANI, who argues that it is a historiographical error to assert that codes break with the tradition of common Roman law, since they do not exhaust the validity of Roman law; rather, they are conceived on the basis of common Roman law, constitute an elaboration of it, and remain bound to it, both in terms of filling gaps and in terms of interpretation through the use of the general principles of law derived from it (Schipani, 2021). In the era of the great revolutions, the Italian Romanist asserts, codifications indicate, through the technical concept of "general principles of law," a precise reference to the constituent elements that underpin the Roman legal system elements codified by Justinian. The general principles of law are a technical-dogmatic tool that interprets and guarantees the continuity of the system and its capacity for development. The presence of general principles of law established by the legislature in national legal systems constitutes recognition of the enduring validity of common Roman law, proposing an interpretation of it through these principles (Schipani, 2021).

In contemporary society, where relationships between geographically distant individuals thanks to extraordinary technological progress take place in real time, the demand for a law that can

govern legal facts that transcend the limits traditionally imposed by space and time is becoming increasingly urgent: can we still rely on Roman law in the construction of this new society, the contours of which we are not yet able to see clearly? Is the idea of unifying, standardizing, or harmonizing with Roman law serving as the binding force a feasible one?

From this perspective, the studies conducted by comparative legal scholars are fundamental to understanding the issue. These legal scholars observe that legal solutions vary from one place to another, or from one group of people to another; they recognize that the various positive legal systems are fundamentally different, even though they are all fully legitimate; and, beginning in the 20th century, they began to focus on identifying and measuring the similarities and differences. Granted that many legal systems could be analyzed comparatively, it has become apparent over time that many systems different from but derived from European ones could be the subject of study by comparative legal scholars. Comparative

legal comparison, a branch of legal science, studies the rules belonging to various legal systems to determine how closely they align and to what extent they diverge (Sacco, R. 1996).

With the emergence of legal comparison, comparative studies flourished. On this side of the Atlantic, one of our earliest comparative legal scholars, C. BEVILAQUA, Legal Advisor to the Ministry of Foreign Affairs, in Opinion No. 15 of 1928, responded to a request from the Italian legal scholar V. SCIALOJA, then President of the International Institute of Rome for the Unification of Private Law, addressed the issue concerning the unification of private law. The Brazilian jurist observed that by contemplating the evolutionary path of culture long developed by different peoples and passed down as a legacy from one to another over the centuries one can glimpse a profound sense of unity within the human family. This very sentiment provides us with the identity of the social structure in its fundamental features; furthermore, natural law is also an expression of this same sentiment, aspiring to break away from the "narrow and crude reality." Many esteemed jurists, writes C. BEVILAQUA, demonstrate the universality of legal phenomenology; on the other hand, the phenomenon of reception, transmission, or communicability of law, "of which such striking cases are known in history, whether from more distant times or from our own days, irrefutably demonstrates, as DEL VECCHIO observes, a certain unity of the human being" (Beviláqua, 1897).

In the opinion of C. BEVILAQUA:

These considerations lead us to believe that, if humanity undeniably tends toward unity through civilization; if the structure of society, in its general outlines, is similar wherever man organizes it; if historical experience demonstrates the possibility of legal adaptations, whether on a mass scale or through limited grafts; all of this leads us to suppose that promoting the unity of private law is to work toward civilization (Beviláqua, 1897).

Naturally, this unity cannot encompass the totality of legal institutions and relationships, since there are legal relationships that are more strongly influenced by local culture such as family relationships in which historical and mesological conditions will contribute to the preservation of differences, despite the leveling power of civilization. C. BEVILAQUA argues in favor of orienting legal culture toward the unification of certain areas of private law, "so that it may reflect the reality of social life at the present moment, in which individual relationships extend beyond the borders of each people and are increasingly spreading and intensifying." In this sense, according to him, progress is made under the influence of laws of imitation, since, for example, in the case of Latin America, it is evident that the legal- l framework of A. TEIXEIRA DE FREITAS constitutes a predominant element among the sources of the Argentine Civil Code, drafted by VELEZ SARSFIELD, and, in turn, the Chilean Civil Code inspired that of Colombia; the Venezuelan

Civil Code was modeled on the Italian code, and the Bolivian Civil Code adopted from the French code everything that did not conflict with the deeply rooted institutions of Iberian origin; thus, there are already numerous similarities that can be observed in the formation of a common law. With regard to the law of obligations in the Western world, C. BEVILAQUA teaches that it rests on the solid and broad foundation of Roman law (Beviláqua, 1897).

It is worth noting that an initial idea for the unification of obligations albeit solely at the level of domestic law had already been advocated in 1867 by A. TEIXEIRA DE FREITAS, who had proposed a new plan for the Code, calling for the unification of the Civil Code and the Commercial Code. The Empire's jurist thus justified and explained the reasons that had led him to change the plan of the Draft, out of an ardent love for the pursuit of legal truth:

The Government is awaiting a Draft Civil Code based on the system set forth in that Outline a system outlined in my contract of January 10, 1859 and for me there is no longer any possibility of adhering to that system, as I am convinced that the Government desires a different approach to its implementation.

The Government wants a draft Civil Code to serve as a supplement to a Commercial Code; it intends to retain the existing Commercial Code with the revision it has planned for it; and today my views are different; they are utterly opposed to this calamitous duplication of civil laws, and I do not see any branch within the body of laws of this kind that would require a Commercial Code (Lobo, 2006).

A. TEIXEIRA DE FREITAS envisioned the drafting of two Codes: a General Code and a Civil Code, the former being a code of definitions, similar to the last two titles of the Digest, "de verborum significatione" and "de diversis regulis juris antiqui." The primary benefit of unification is defended as follows:

The difference between legislative terminology and that found in commonly used legal dictionaries is the same as that which distinguishes a law from an opinion, or certainty from doubt. What is lacking is binding force for the meaning of the legislator's words, especially technical terms. Without such a measure, there will be no good law, and permanent uncertainty will reign in the administration of justice. The proposed General Code will contain all necessary definitions both those of overarching matters and those of the provisions of each of the specific codes so that nothing is defined in the latter (Lobo, 2006).

The Brazilian jurist proposed a General Code containing laws that instruct, and a Civil Code containing laws that command. The former for scholars, the latter for the people. The unification of private law, advocated by A. TEIXEIRA DE FREITAS, would become a reality, initially in Switzerland with the Federal Code of Obligations of 1881 which unified civil and commercial obligations and subsequently in Italy with the Civil Code of 1942. The concept of unification outlined by C. BEVILAQUA, a professor of comparative law, is not the same as that of A. TEIXEIRA DE FREITAS: the latter advocates for the unification of obligations within a single legal system, while the former envisions the possibility of unifying the rules governing obligations across different legal systems.

Harmonization of the Law

The movement toward a gradual international unification of the law began, paradoxically, during the same period in which the last major national codifications were enacted; this apparent paradox can be explained by considering that this era also marked the transition from an agricultural and artisanal economy to an industrial economy, characterized by mass production

and the mass distribution of goods and services. Faced with an intensification of cross-border trade facilitated by technological advances in communications and transportation the disappearance of the old ius commune, and the emergence of national legal systems which were sometimes in conflict not only formally but also in substance all of this could only be perceived as a serious obstacle to an orderly and secure business environment. The first steps toward achieving greater regulatory uniformity at the international level were taken in the field of intellectual property with the Paris Convention for the Protection of Industrial Property in 1883. After World War I, the idea of unifying the law was revived, and under the auspices of the League of Nations, the Institute for the Unification of Private Law (UNIDROIT) was established in 1926 (Bonell, 2012).

In a world characterized by ever-increasing mobility of people, as well as significant circulation of goods and services, it is natural, argues M.J. BONELL, it is natural for legal scholars to have not only a theoretical interest, but also for legal practitioners to have a practical interest in disciplines such as comparative law and uniform law, which seek to address the numerous legal challenges posed by the growing phenomenon of the internationalization or globalization of economic and social relations. As for comparative law, its primary aim is to identify and, if possible, explain the formal and substantive convergences and divergences among various national legal systems, focusing on problems and functions rather than on concepts and institutions, in an effort to create a truly transnational language and system of communication among legal scholars worldwide. Uniform law, in turn or, if one prefers, the unification or harmonization of law seeks to overcome the existing contrasts between different national legal systems by proposing common legislation, or at least legislation that is more closely aligned, with the goal of resolving specific issues related to certain subjects (Bonell, 2012). This perspective confirms that comparative legal research is today an essential tool for the construction of shared interpretive models and for the development of regulatory harmonization processes based on interdisciplinary scientific methodologies (Barros & Bores, 2024).

It must be emphasized that the forms of unification differ from those of harmonization. R. CARDILLI observes that in the effort to create a common law for private relationships, the initial idea was

"to replace the various national legal systems with a single substantive law that would correspond, in its principles, rules, and concepts, to a single body of law which as a consequence of the utopian notion of the deductive logic underlying the modern application of law would then be implemented uniformly across the various legal systems. The path thus undertaken proved problematic due to the underlying assumption on which it was based. A uniform substantive law imposed from above on the various national jurisdictions is unable to achieve a true common law, since cultural resistance and the judicial environments of individual countries have continued to be significant obstacles to a concrete unification of the law" (Cardilli, 2020).

Thus, to overcome the difficulties posed by unification, another path was chosen: that of harmonization no longer a single body of law imposed from above, but rather the search for common elements that could serve as points of reference, that is, the identification of instruments whose adoption would allow for a gradual convergence among legal systems.

Furthermore, in this scenario, we must take into account the phenomenon of globalization, in both its positive and negative aspects. Z. BAUMAN asserts that "globalization" is a buzzword that quickly turns into a magic spell: for some, it is what we must do if we want to be happy; for others, it is the cause of our unhappiness; nevertheless, for everyone, "globalization" is the world's inescapable destiny, an irreversible process (Bauman, 1999). The Polish sociologist

observes that geographical factors, the natural and artificial boundaries of territories, the distinct identities of populations, as well as the distinction between "inside" and "outside," may have been mere "conceptual derivatives, residues, or material constructs of 'speed limits' or, more generally, of the time and cost constraints imposed on freedom of movement." Distances, Z. BAUMAN asserts, no longer matter, while the idea of a geographical border is increasingly difficult to sustain in the "real" world. It seems clear that the divisions of the continents and the globe as a whole were based on distances, once imposed by reality due to primitive transportation and the difficulties of travel.

Based on this worldview, we find, in the West, a growing demand for the development of uniform law or harmonization. This demand, in addition to being more directly linked to interests related to economic activities, encompasses aspirations regarding the creation of international criminal courts, the universal protection of human rights, and even the export of the rules of democracy (Buzzani, 2010).

As early as 1993, a seminar was held in Rome on the UNIDROIT project "Principles for International Commercial Contracts and the Unity and Specificity of the Latin American Legal System," at which M.J. BONELL stated that initiatives for the international unification of law had, up to that point, taken the form of binding normative acts, such as international conventions, supranational legislative measures, or simple model laws. However, the Italian comparative law scholar noted that, given that these instruments risked becoming a dead letter due to a failure to incorporate them into the various national legal systems or were fragmentary in nature without, moreover, eliminating the need to resort to national laws efforts were intensified to promote greater use of non-legislative instruments in the process of unifying and harmonizing the law. Some proposed increasing the development of so-called "international commercial practices" that is, the set of clauses, general terms and conditions, and standard contracts that had developed spontaneously in the practice of international trade; others, noting that these contractual instruments reflected only the interests of one party and, in any case, presupposed the existence of a more general legal framework within which they could operate, proposed the development, at the supranational level, of such a legal framework a sort of modern ius commune in the form of a restatement of general principles of contract law. UNIDROIT's efforts fell within this framework, with the drafting of the Principles of International Commercial Contracts. The UNIDROIT project, however, had an even more ambitious goal, since these principles and rules were intended to be universally applied and, therefore, to reflect the world's most important legal systems. The UNIDROIT Principles were adopted in July 1994.

However, the UNIDROIT Principles do not aim to unify national laws, but rather to set forth principles and rules in contract law that are common to the major existing legal systems and to identify the solutions best suited to the specific needs of international trade. Nevertheless, as M.J. BONELL argues, the Principles can serve as guidelines in the drafting of international commercial contracts; the parties to these contracts come from different countries and face communication challenges, since the terminology derived from a specific national legal system is often unfamiliar to one of the parties. By using concepts and expressions contained in the Principles, the parties can rely on neutral terminology that has a universally uniform meaning. Furthermore, the Principles represent a coherent set of principles and rules common to the major legal systems; these may constitute a sort of modern ius commune or may be the authentic expression of what is commonly referred to as lex mercatoria, to which the parties or, in the event of a dispute, the arbitrators could refer as the governing law of the contract (Bonell, 1996).

In light of the choices made in the effort to achieve a standardization or harmonization of the law necessary to ensure a minimum level of legal certainty in international transactions it is clear that

the use of the principles that characterize legal systems, and their subsystems, within which we find various national legal orders, could make the unification of the law possible, particularly in the area of contracts and obligations.

The European project known as the Draft Common Frame of Reference, published in its final version in 2009, fits into this context. The European Commission, through a Communication in 2003, launched a concrete initiative to develop a "Framework of Reference" that would allow for greater consistency in European contract law, recognizing the importance of this "Framework of Reference," which would establish common principles, concepts, and terms in contract law; from a broader perspective, the DCFR was intended to serve as the foundation for further developments aimed at creating a uniform and comprehensive body of contract law (Luccchetti, 2009).

J.M. RAINER notes that as early as 1989, the European Parliament had called on all member states to unify their private law, as this was the area of utmost importance for Europe. From this perspective, the German jurist states:

Roman law is the only basis truly common to all legal systems, including at least conceptually, albeit to a lesser extent Common Law. [...] Comparative law and Roman law are the cornerstones of this new civil law doctrine; together, they must lay the groundwork for a European Civil Code in the years to come (Rainer, 1998).

The deepening of studies on the history of the Roman legal system and its subsequent applications takes on, in our time a period characterized, according to L. SOLIDORO MARUOTTI, by the construction of the cosmopolitan nation-state ## a particular significance; This is because Roman civilization realized, at two distinct historical moments (in the 3rd century B.C., with its expansion into the Mediterranean world, and in the 3rd century A.D., with the granting of Roman citizenship to all inhabitants of the Empire), certain elements of the modern idea of a universal law that is, a law that transcends the boundaries of a specific political organization. It is necessary to clarify that, according to current thinking, this universal right can, on the one hand, refer to a system that complements state rights and the international legal order, and on the other, it can be conceived as a framework governing international commercial relations, consisting of the "denationalization" of such relations or their partial or total submission to principles and rules of non-national, supranational, or transnational origin (Maruotti, 2011).

Latin American Law and Its System

When the peoples of Latin America achieved independence, freeing themselves from the colonial powers, they clearly asserted their Latin identity by developing legal systems rooted in Roman law, thereby becoming part of the Romanistic system or the Romano-Germanic family, according to the terminology of R. DAVID. The French comparative law scholar teaches that the laws of the Romano-Germanic family are principle-based, as required by the system, and not case-based (David, 2002).

Within the Roman-Germanic legal system, a legal norm should not be understood as a rule designed to guarantee the resolution of a specific case, but rather as a rule of conduct one of a certain generality that stands above the specific applications that may be made of it by courts and legal practitioners. Legal norms are general and abstract, based on principles that characterize the system and contribute to maintaining its unity.

It is important to note that, regarding the development of the concept of ius Romanum, P. CATALANO explains the difference between the "effectiveness" and "validity" of Roman law:

This concept (ius Romanum) was refined by Justinian (who also uses the expressions Romanae leges and Romana sanctio) as an instrument of a universalist conception of law [...] which does not consider what we today call "effectiveness" to be an essential characteristic of the iura. Law is clearly distinct from fact (that is, from its very application)... (Catalano, 1990).

The peoples of independent Latin America are well aware of their deep roots in the Roman legal system and its ever-evolving universalism; as DARCY RIBEIRO aptly stated on the occasion of the City of Rome awarding the "Rome-Brasília" Prize to the great Brazilian sociologist:

Today we are one people, the New Rome. United by language, culture, and destiny [...] It is we who will represent the Roman tradition in the concert of the coming centuries and millennia (Ribeiro, 1997).

In fact, Clovis BEVILÁQUA, author of the 1916 Civil Code, had already asserted in the 19th century the existence of a Latin American legal system or subsystem within the framework of the Roman law system:

"It is necessary to add a fourth group to these, composed of the legal systems of the Latin American peoples, which the wise French jurist did not consider, but which cannot logically be included in any of the three categories mentioned, because, although they derive from European sources closely related to one another (Portuguese and Spanish law), they have modified this common element in different ways, due to their own specific conditions and through the assimilation of European elements from another category, primarily French ones. And because it stems from new, essentially democratic countries, this fourth group exhibits certain bold innovations characteristic of those who are not afraid of the new, as well as certain weaknesses in which freedom is allowed to flourish more broadly." (Beviláqua, 1897).

It is also important to note that in Latin America we do not find a hegemony of statal-legalism, since the assessment appears well-founded that the reference to general principles of law, contained in the legal systems of each Latin American republic, shows these general principles to be rooted in the Roman legal system and not determined by national legal systems (Schipani, 2021)

It should also be noted and emphasized that the Latin American legal system has its roots in Roman law, but it is not a mere copy of European legal systems. Undoubtedly, studies that seek to identify "the common roots between Latin America and Europe" are useful and necessary, but it is not possible, as A. SACCOCCIO, "to disregard the distinctive features that, even within the common system, lead us to define the Latin American continent in some way." It is undeniable that at the dawn of Latin American nations' independence from their n metropolises in the 19th century, the "law of imitation," the "transfusion," or the "reception" of European models were mechanisms used to consolidate their independence; however, with few exceptions, European models were studied and adapted to local needs.

In Brazil, AUGUSTO TEIXEIRA DE FREITAS, author of the monumental *Consolidação das Leis Civis* (1857) a text that would serve as the civil code until the enactment of the first Brazilian civil code in 1916 studied, reflected upon, and applied the findings of the leading legal scholarship of his time; he considered the modern codes already in force, but with an open mind; at times he accepted codification theories and models, while at other times he rejected them for example, when he criticized, as Andrés Bello had already done, the Code Napoléon for failing to maintain the Roman distinction between title and the mode of acquiring ownership:

"Notwithstanding its artificial method, and with the flawed principle of the transfer of ownership solely by virtue of contracts, the Civil Code of France has exerted a powerful influence." Another significant example of the imperial jurist's concern for local needs can be found in the treatment of foreigners, since he eliminates the status of "foreigner" as opposed to that of "citizen," as Freitas states:

There is no possible case among us of deprivation of civil rights, whether through the loss of Brazilian citizenship or as a result of judicial convictions. To suppose today a Civil Law based purely on nationality, to deny civil rights to foreigners, to speak of "civil death," is to conceive of a chimerical state of affairs that evokes traditions of Roman law; it reproduces flawed theories of French law; yet it bears no resemblance to the reality of our lives (Teixeira de Freitas, 2003).

Note that A. TEIXEIRA DE FREITAS exercises here, on the one hand, absolute intellectual independence with regard to the Civil Code, explicitly criticizing that model; on the other hand, he keeps the provision anchored in the tradition of the peoples of Latin America, as A. BELLO had already done when drafting Art. 57 of the Chilean Civil Code a provision that still stands in the text of the current Chilean Civil Code. FREITAS's intellectual freedom also leads him to reflect on his own Roman legal system; concerned with the choice of criteria for classifying legal rules, our jurist rejects Gaius's classification: *Omne ius vel ad personas pertinet, vel ad res, vel ad actiones* (Gaius 1.8; D. 1.5.1), and embraces Leibniz's proposal, which, in criticizing Gaius's *Institutes*, argues that the division that can serve as a basis for classification is the distinction observed between rights and obligations; it is not persons or things that must be distinguished, but their obligations and their rights, since actions are nothing more than the consequences of rights (Teixeira de Freitas, 2003).

The Harmonization of Law in Latin America

In Latin America, in March 1999, as part of the Meeting of Regional and Subregional Organizations with Science and Technology Programs Operating Primarily in Latin America, held in São Paulo, the Latin American Parliament released a document titled "Methodological Guidelines for Conducting Studies on Legislative Harmonization," which states that one of the most important and perhaps the most difficult actions to undertake within an integration process is legislative harmonization. The document identifies as fundamental elements of the proposed methodology the collection, review, and analysis in Latin American countries of both the regulations pertaining to a specific subject matter and the study of international agreements, whether global or sector-specific, public or private in nature, as well as specialized studies. This is foundational work aimed at describing and analyzing the fundamental principles that must necessarily be taken into account and the basic rights that must necessarily be protected in any type of legislation pertaining to the subject at hand. Where possible, the Latin American Parliament recommends preparing a framework code which, in some cases, may be adopted as a bill in a specific country or, in other cases, may serve as a reference framework for updating or enriching the legal systems of countries on the subject in question (Latin American Parliament, 2006)

Taking into account the methodological model proposed by the Latin American Parliament in 2013, the Group for the Harmonization of Law in Latin America (GADAL) was established in Lima, Peru, composed of legal experts from various Latin American countries (Argentina, Brazil, Colombia, Chile, Mexico, Peru, and Venezuela). Its objective is to propose initiatives for the harmonization of law in Latin America that highlight the distinctiveness and richness of the Latin American legal subsystem, which derives from the Romano-Germanic legal system. GADAL's work has focused on the harmonization of the law of obligations, having, in an initial phase,

analyzed the current state of this area of law in each of the Latin American countries that are members of the group. GADAL subsequently intends to develop concrete instruments (codes or framework laws) for the harmonization and modernization of the law of obligations, taking into account the Roman law tradition and the region's specific characteristics, while also considering developments in this field within the context of comparative law, particularly other experiences in the harmonization of private law. To this end, GADAL has begun drafting a Framework Code of Obligations for Latin America, formulating two sets of articles: a) some relating to obligations definition, elements, sources (approved by vote on June 27, 2016); b) others concerning the general principles governing obligations (voted on November 14, 2016). During the International Congress "Europe and Latin America. Two Continents, One Law: Unity and Specificity of the Latin American Legal System, held at the University of Brescia on March 19–22, 2019, this legal framework for the Framework Code of Obligations for Latin America was presented and analyzed, and is known as the Gadal Principles (Saccoccio, 2020).

The formation of international academic networks dedicated to the production and dissemination of legal knowledge is also an indispensable condition for consolidating these harmonization processes, fostering scientific cooperation among Latin American universities and the development of a shared legal culture (Cárdenas-Palomino et al., 2024).

It therefore seems evident that there is a need to reflect on the creation of legal instruments that can foster the construction of the 21st-century "global society," at least as far as commercial relations are concerned.

In Brazil, the construction of a Latin American legal identity was certainly a necessity recognized by the framers of the 1988 Constitution, since the sole paragraph of Art. 4, Title I On Fundamental Principles, of the 1988 Federal Constitution, establishes the commitment of the Federative Republic of Brazil to seek the economic, political, social, and cultural integration of the peoples of Latin America, with the aim of forming a Latin American community of nations.

This constitutional provision clearly establishes Brazil's commitment to seeking mechanisms to achieve the creation of a Latin American community of nations a project that is certainly still far from being realized but which nonetheless remains of fundamental importance, since the Constitution considers integration processes to be a fundamental principle of the Brazilian State.

Now, when speaking of the integration of the Latin American peoples and the building of a Latin American community, how can we leave the law out of the picture? In addition to economic integration, efforts must be made to ensure that the community of Latin American peoples becomes a reality. Going further, if we consider the world in its globalized form we believe that legal scholars will have much work to do to build the new international order that has been discussed since the end of the Cold War, but whose contours still seem difficult to discern clearly.

Can Roman law still serve as a tool for creating a common legal language among the peoples of Latin America?

Certainly, positive law takes different forms in various countries; the rules are not identical, but, beginning in the 20th century, comparative legal scholars became aware that, although different, legal systems can share commonalities. Thus, an interest arose in assessing the similarities and differences between legal systems, and comparative law was born. The initial aim of Legal Comparison was to extract, from the totality of specific institutions, a common foundation or at least to identify points of contact that could highlight the fundamental unity of universal legal life. Many legal scholars subsequently defined "legal comparison" as the analysis that seeks to standardize the legal rules of various systems.

Therefore, it is essential to analyze the principles that guide Latin American legal systems in particular those of Brazil, Argentina, and Chile using a historical-critical method, since, as R. ZIMMERMANN, echoing the thought of E. SECKEL, "without its non-positive foundations, one cannot understand positive private law [...] the natural bond that unites the present and the past cannot be torn apart with impunity" (Zimmermann, 2001).

It is evident that the development of a uniform or harmonized Latin American legal system capable of addressing the legal challenges of a globalized world involves interdisciplinary aspects, as its evolution must take into account the contributions of Roman law, comparative law, civil law, and, not least, international law.

I am convinced that, at least in the area of contracts and obligations, the Roman law system can certainly serve as a tool to facilitate the desired harmonization or, even more so, the unification of the law of obligations, particularly those arising from contracts.

Conclusions

The analysis conducted allows us to affirm that Roman law continues to constitute the principal historical and dogmatic foundation of the Latin American legal system. Far from representing merely a historical legacy, its categories, principles, and institutions retain the full capacity to serve as elements of integration among the various national legal systems belonging to the Romano-Germanic tradition. The continuity of Roman legal thought explains how, despite the diversity of laws in force in Latin America, a common core of principles persists that fosters dialogue among the various legal systems.

The study of codifications demonstrates that the phenomenon of codification did not result in a break with the tradition of the *ius commune*, but rather in a new mode of expression for its fundamental principles. Both the Justinian Code and the major modern codifications particularly the Napoleonic Code and the Latin American codifications have consolidated legal solutions rooted in Roman legal tradition, ensuring the continuity of a systematic structure based on the general principles of law.

The research also highlights that contemporary processes of legal harmonization must be distinguished from projects of legal unification. While unification tends to replace individual national legal systems with a uniform body of laws, harmonization aims to bring different legal disciplines closer together while respecting the historical, cultural, and institutional characteristics of each legal system. From this perspective, the principles derived from Roman law constitute a common legal language, suitable for promoting regulatory convergence without compromising the identity of individual national systems.

The intensification of international economic relations, the phenomenon of globalization, and the growing movement of people, goods, and services make the need for common tools capable of ensuring legal certainty in transnational relations increasingly evident. Initiatives such as the UNIDROIT Principles, the *Draft Common Frame of Reference*, and other harmonization efforts demonstrate that the development of shared principles constitutes a more effective solution than the imposition of uniform legislative models, confirming the methodological relevance of Roman law as the foundation of a common law.

With specific reference to Latin America, the research confirms that the existence of a shared legal tradition formed through a common Roman law heritage and consolidated in national codifications represents an objective prerequisite for the advancement of regional harmonization processes. The initiatives promoted by the Latin American Parliament and, in

particular, by the Group for the Harmonization of Law in Latin America (GADAL), demonstrate the concrete possibility of developing common regulatory instruments that simultaneously enhance both the unity of the system and the specific characteristics of individual legal systems.

In conclusion, the universal nature of Roman law remains fully relevant today as the scientific foundation of Latin American legal integration. Rather than a collection of rules belonging to the past, Roman law continues to represent a system of principles, categories, and interpretive methods capable of offering common criteria for addressing the challenges posed by the internationalization of legal relations. From this perspective, the harmonization of Latin American law finds in the Roman legal tradition not only its historical origin but also the primary element of cohesion for the construction of a common legal space.

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Institutional Mechanisms for Subnational Tax Revenue Generation in Contexts of Incomplete Federalism: The Registration of Foreign Vehicles in a Non-Border State of Mexico

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Introduction

The problem of subnational fiscal dependence in Latin American federal systems is not new, but it is persistent. In Mexico, states receive more than 80% of their total revenue through federal transfers (shares from Branch 28 and contributions from Branch 33), while autonomous revenue generation remains marginal, accounting for less than 10% of total revenue in most non-border states (Peredo Rivera, 2022; Sovilla and Morales Velasco, 2025). This asymmetry between spending responsibilities and revenue-raising powers is the clearest manifestation of what the literature refers to as *incomplete fiscal federalism* (Oates, 1999; Bahl and Bird, 2018).

In this context, federal policies aimed at formalizing informal assets represent an exceptional means of broadening the subnational tax base that does not require local regulatory reform. The decree on the regularization of foreign-origin vehicles published in the Official Gazette of the Federation on January 19, 2022, is a paradigmatic case: for the first time since the 2005 decrees, the instrument extended its benefits to non-border states and established a mechanism for the direct transfer of funds to state treasuries through budget program U151 under Branch 23. However, the existing literature has focused almost exclusively on national macroeconomic effects (Álvarez López et al., 2024) and on border states with radically different fiscal structures (Orozco Reynoso, 2025), leaving unexamined the specific institutional mechanisms that determine the scope and limitations of the instrument in states with high federal dependency. The research question is: Through which institutional mechanisms did the federal vehicle registration decree enable a non-border state with high transfer dependency to raise additional fiscal resources, and what role does local institutional capacity play in the effective absorption of these resources?

This article argues that vehicle regularization decrees do not operate simply as sources of additional revenue, but rather as *institutional bypass mechanisms*: instruments that, within the constraints of incomplete federalism, enable subnational governments to raise resources through two distinct channels earmarked transfers and own-source revenue from vehicle registration whose magnitude and distribution reveal the institutional architecture of local public finance. The state of Nayarit provides the ideal case study: a non-border state with federal dependence exceeding 85%, included since the first version of the decree, with official data disaggregated at the municipal level that allow for the reconstruction of both revenue streams.

Theoretical Contribution and Positioning within the Literature

The canonical literature on fiscal federalism has tended to conceptualize the relationship between the central government and subnational entities as a problem of allocating taxing powers and redistributing intergovernmental transfers (Oates, 1972; Tiebout, 1956; Bird and Smart, 2002). Under this paradigm, subnational fiscal capacity depends structurally on the institutional design of the federal system: states' revenue-raising autonomy is a function of their position within the formal fiscal architecture. This approach has yielded a rich body of literature on normative analyses of optimal fiscal federalism, but it has systematically underestimated the informal or para-formal institutional arrangements through which subnational governments expand their fiscal space without altering the existing legal framework.

This article addresses that gap through the empirical identification and theoretical conceptualization of what we call *the institutional bypass mechanism*: a recurring configuration through which a subnational entity increases its own-source revenues by taking advantage of federal-level policy decisions without undergoing a structural reform of its taxing powers. Unlike studies on subnational fiscal effort (Bonet-Morón et al., 2020; Ibarra-Salazar, 2021), which analyze revenue-raising capacity as an endogenous attribute of local government, the concept of *the* institutional *bypass* shifts the explanation to the interface between federal policy and subnational tax administration. Also unlike approaches to fiscal decentralization (Weingast, 2009; Rodden, 2006), which prioritize the analysis of the formal transfer of powers, the *bypass* mechanism operates precisely in the absence of such a transfer: the subnational entity captures fiscal space by resorting to federal regulations that were not designed for that purpose.

The article's theoretical contribution is threefold. First, it empirically identifies and distinguishes the two revenue-capture mechanisms triggered by formalization decrees earmarked transfers and own-source revenues and demonstrates that their temporal dynamics and territorial distribution respond to distinct institutional logics. Second, it proposes the concept of *the "institutional absorption gap"* to describe the difference between transferred resources and those actually utilized (39.4% in the case analyzed), reframing a descriptive finding as an indicator of subnational bureaucratic capacity. Third, it extends the comparability of the Nayarit case to all non-border Mexican states with similar fiscal dependence, opening up a research agenda that has been absent from the literature.

The article is organized as follows. Section 2 develops the theoretical and institutional framework. Section 3 describes the methodological design. Section 4 presents the results. Section 5 discusses the theoretical and institutional implications. Section 6 presents the conclusions.

Incomplete Federalism, Bypass Mechanisms, and Institutional Capacity

The institutional analysis of the decree requires integrating three theoretical frameworks: fiscal federalism and its conditions of incompleteness in developing economies; the institutional economics of tax compliance; and the literature on subnational state capacity. These three frameworks are not alternative but complementary: the first explains the incentive structure within which the decree operates; the second accounts for the conditions under which voluntary compliance is triggered; and the third helps explain why formally equivalent entities achieve differing fiscal outcomes.

Incomplete Fiscal Federalism and the Transfer Dependency Trap

The theory of fiscal federalism (Musgrave, 1959; Oates, 1999) posits that the decentralization of tax functions and powers to subnational governments improves allocative efficiency in the provision of public goods, strengthens accountability, and reduces the political capture of spending. This argument, however, assumes a condition that is rarely met in Latin America: that the decentralization of spending be symmetrical to the decentralization of revenue collection (Bahl and Bird, 2018).

In the case of Mexico, decentralization has been markedly asymmetric: while spending responsibilities for education, health, and infrastructure were transferred to the states beginning in 1997, revenue-raising powers remained concentrated in the federal government (Peredo Rivera, 2022). The result is what Sovilla and Morales Velasco (2025) call *incomplete federalism*: a system that funds entities that do not autonomously generate their own revenue and that, consequently, lack the institutional incentives to develop local revenue-raising capacity. The central hypothesis of this framework, as applied to the case under study, is that vehicle registration regularization decrees function as windows of opportunity for revenue collection within the trap of incomplete federalism: they allow for the capture of additional revenue without reforming the tax structure, but they do not alter the underlying structural dependency.

H1: The 2022 vehicle regularization decree generated a temporary expansion of the subnational tax base in Nayarit but did not alter the structure of transfer dependency, consistent with the logic of incomplete federalism.

The institutional bypass mechanism: formalization without tax reform and analytical differentiation

The formalization of informal assets as a strategy for broadening the tax base has been analyzed in the literature from two perspectives. The economic perspective (La Porta and Shleifer, 2014) treats it as a private optimization decision subject to transaction costs: informal assets, including unregistered vehicles, remain outside the tax system when the cost of formalization exceeds the private benefit of legal certainty. The institutional perspective (North, 1990; Williamson, 2000) emphasizes that the decision to formalize is also a signal of legitimacy toward the state: taxpayers formalize when they trust that institutions will use resources effectively and equitably.

The 2022 decree addressed both aspects simultaneously. On the one hand, it reduced the cost of formalization by setting a single federal fee of 2,500 pesos lower than the regular import cost and by providing immediate legal certainty regarding vehicle ownership. On the other hand, it visibly linked the revenue collected to road paving projects in the municipalities of origin of the regularized vehicles, triggering what Torgler (2007) and Frey and Torgler (2007) call *conditional reciprocity*: the willingness to comply with tax obligations increases when taxpayers perceive that their contribution translates into verifiable and locally attributable public goods.

The concept of *an institutional bypass mechanism* differs analytically from the two conventional instruments of subnational tax revenue generation: intergovernmental transfers and structural tax reforms. Transfers whether conditional or in the form of federal revenue-sharing (Branch 28, Branch 33) represent vertical flows of resources whose rationale is based on national redistributive criteria; their increase does not reflect the recipient state's own institutional capacity nor does it generate incentives for local tax collection efficiency (Bird and Smart, 2002; Díaz-Cayeros, 2006). Structural tax reforms, for their part, modify the legal framework governing

subnational fiscal powers and, in federal contexts such as Mexico's, involve high-stakes political negotiations that rarely result in outcomes favorable to the states (Sempere and Sobarzo, 1998). The *bypass* mechanism operates in an intermediate and qualitatively distinct space: it requires neither vertical transfers nor legal reform, but rather articulates local institutional capacity with a federal regulatory decision whose primary purpose was not fiscal. This distinction implies that subnational fiscal capacity can be expanded through processes of institutional coupling that leave no trace in conventional indicators of tax autonomy (Mahoney and Thelen, 2010).

Subnational Institutional Capacity as a Mediating Variable

Recent literature on subnational fiscal performance has identified local institutional capacity defined as the set of organizational, technical, and administrative resources available to a jurisdiction to implement policies and execute spending as the main differentiating factor among jurisdictions with similar fiscal characteristics (Beltrán et al., 2025; Del Castillo and Cabral, 2024). In the context of time-limited policies such as formalization decrees, this capacity manifests itself in two dimensions: the operational capacity to process records during the decree's duration, and the programming capacity to absorb and execute the extraordinary resources transferred.

Gómez Álvarez and Maldonado Bernal (2023) document that state revenue collections in Nayarit exhibit technical capacity deficits in both dimensions, which allows us to formulate the second working hypothesis:

H2: The gap between federal resources transferred and those actually spent on public works reflects institutional capacity constraints in the programming of extraordinary expenditures, rather than factors such as corruption or the diversion of resources.

Mechanism 1: Earmarked federal transfers (U151) and their temporal dynamics

The first institutional mechanism activated by the decree was the earmarked federal transfer through Branch 23, Program U151. During fiscal year 2022, the government of Nayarit received a total of $77,174,082.34 pesos in four reporting periods (Table 1). The temporal distribution reveals a significant institutional feature: 97.4% of the funds were concentrated in the first two reporting periods, indicating that the demand for formalization was particularly intense at the start of the decree's effective period and quickly subsided consistent with the literature on voluntary compliance in response to temporary incentives with a fixed expiration date (Torgler, 2007).

Table 1. *Federal transfers received by Nayarit from the U151 program, fiscal year 2022.*

Reporting Date	Amount (pesos)	% of total	Cumulative %
April 29, 2023	36,593,022.83	47.4	47.4
July 31, 2023	38,657,984.51	50.1	97.5
October 31, 2023	1,860,637.50	2.4	99.9
January 31, 2024	62,437.50	0.1	100.0
Total	**77,174,082.34**	**100.0**	

Expansion of the Own-Revenue Base and Territorial Distribution

The second mechanism operated through vehicle registration with the state treasury. With a unit cost of $1,674.24 per vehicle (Table 2), the regularization of 18,719 vehicles generated $31,341,017.19 in own-source revenue, equivalent to 2.5% of Nayarit's total state revenue in 2022, collected without altering the local tax structure in a context where historical own-source revenue accounts for less than 8% of total revenue.

Table 2. *Cost structure of vehicle registration per vehicle, Nayarit 2022.*

Item	Legal Basis	UMA (× $96.22)	Amount ($)
Issuance of license plates	Art. 26, Section I, Subsection a	10.9	1,048.80
Vehicle registration card	Art. 26, Section II, Subsection a	3.7	356.02
Initial inspection	Art. 37, Section VII, Subsection a	2.8	269.42
Total per vehicle		**17.4 UMA**	**1,674.24**

Table 3. *Distribution of the U151 program to municipalities in Nayarit and regularized vehicles, 2022.*

Municipality	Amount Allocated ($)	No. of projects	Vehicles	% of total
Tepic	15,292,500.00	6	6,117	32.7%
Compostela	7,245,000.00	4	2,898	15.5%
Tecuala	5,587,500.00	6	2,235	11.9%
Bahía de Banderas	4,700,000.00	4	1,880	10.0%
Acaponeta	4,455,000.00	6	1,782	9.5%
Xalisco	2,872,500.00	6	1,149	6.1%
Amatlán de Cañas	1,706,322.48	3	683	3.6%
Santiago Ixcuintla	1,773,225.00	7	710	3.8%
Santa María del Oro	1,108,890.00	4	444	2.4%
San Blas	1,014,780.07	2	407	2.2%
San Pedro Lagunillas	444,952.96	4	178	1.0%
Ahuacatlán	468,716.15	12	188	1.0%
Del Nayar	125,000.00	2	50	0.3%
Total exercised	**46,794,386.66**	**66**	**18,719**	**100%**

Institutional absorption capacity and under-execution gap

The third empirical finding and the one with the greatest theoretical relevance is the gap between federal funds received and funds actually reported as spent on public works. The difference amounts to $30,379,695.68, equivalent to 39.4% of the total transferred. As an indicator of institutional absorption capacity, this result reveals that the municipalities of Nayarit were unable to program and spend 39.4% of extraordinary funds an amount equivalent to nearly six times the state's average monthly own-source revenue.

The territorial distribution of the U151 program also replicates, within the state itself, the asymmetry that federalism generates among states: Tepic accounted for 32.7% of the vehicles brought into compliance and spent 100% of its allocated funds, while Del Nayar barely reached 40% execution. This heterogeneity is analytically relevant: it illustrates that the absorption gap is not uniform and that it stems from differences in local technical capacity, not from the diversion of resources.

Table 4. *Summary of the total fiscal impact of the decree in Nayarit, 2022.*

Component	Amount ($)	% of total	Institutional Mechanism
Federal transfers received (U151)	77,174,082.34	71.1%	Earmarked federal bypass funds
Own revenue from vehicle registration	31,341,017.19	28.9%	Expansion of the tax base
Estimated total fiscal impact	**108,515,099.53**	**100%**	
Underexecution gap (U151)	30,379,695.68	39.4% of U151	Institutional constraint

Author's own calculation. The under-execution gap is calculated as the difference between transfers received ($77.17 M) and funds spent on public works ($46.79 M).

The documented revenue dynamics are not merely empirical data; they are the quantitative expression of an institutional relationship that the subnational fiscal literature had not previously formalized. The fact that a state government can increase its own-source revenues by a statistically significant percentage without amending its tax legislation, without negotiating new federal revenue-sharing agreements, and without expanding its formal tax base implies that the conventional concept of subnational fiscal capacity understood as a function of the legal framework and local administrative efficiency is analytically insufficient. The evidence from Nayarit suggests that this capacity has a contingent dimension: it depends on the local government's ability to identify and exploit regulatory opportunities generated endogenously by federal policy.

The decree as a bypass mechanism: a contradiction with fiscal effort approaches

Unlike studies that attribute subnational revenue collection weaknesses in Mexico to structural factors such as endogenous institutional capacity, technical inadequacy, political capture, or a narrow tax base (Bahl and Linn, 1992; Ibarra-Salazar and Sotres-Cervantes, 2009), the findings of this study suggest that the variability in ISAV revenue and in the " " own-source revenues in

Nayarit cannot be explained by these internal variables. The most pronounced fluctuations in revenue coincide not with changes in local administrative capacity, but with the implementation of the federal vehicle regularization decree. This result directly challenges the assumption that subnational fiscal effort is primarily a function of internal factors. The literature has built its agenda of recommendations including cadastral modernization, administrative digitization, and the strengthening of local treasuries on this assumption, without considering that revenue dynamics may be determined to a greater extent by the architecture of federal policy.

The findings confirm Hypothesis H1: the decree generated a temporary and quantifiable expansion of the subnational tax base $108.51 million in additional revenue without altering Nayarit's structure of dependence on federal transfers. This finding is relevant because it suggests that, in contexts of incomplete federalism, fiscal innovation does not necessarily stem from structural reforms, but rather from the strategic exploitation of temporary federal instruments. The result is directly consistent with Lago et al. (2024), who identify that earmarked federal transfer mechanisms can strengthen subnational spending capacity when linked to locally verifiable outcomes.

Institutional Reinterpretation: Regulatory Coupling and Fiscal Heterogeneity

This finding suggests that the literature on fiscal decentralization has underestimated the role played by the federal-subnational regulatory interface as a determinant of states' revenue-raising behavior. Dominant approaches have conceptualized this interface as a system of passive transfers or conditional mandates; the present study demonstrates that it also acts as a mechanism for generating fiscal opportunities that subnational governments exploit in different ways depending on their capacity for institutional coupling. In the terms of North (1990), what varies among states is not only the set of formal rules under which they operate, but also their ability to identify and take advantage of the regulatory windows that the federal level opens without deliberately designing them as revenue-raising mechanisms.

The findings challenge the notion that Mexican fiscal federalism operates under an exclusively vertical logic of resource allocation; the evidence instead points to the existence of a horizontal and informal dimension of fiscal expansion that conventional models fail to capture. From the perspective of Mahoney and Thelen (2010), the behavior documented in Nayarit can be interpreted as "*institutional layering*": the *bypass* mechanism overlays the formal tax architecture without modifying it, adding a layer of para-formal operation that expands the subnational government's fiscal space.

The Absorption Gap as an Indicator of Bureaucratic Constraints and Policy Implications

Hypothesis H2 that the under-execution gap reflects institutional capacity constraints rather than resource diversion is supported by two lines of evidence. The first is the earmarked nature of U151 transfers, which prevents their free reallocation. The second is the documentation by Gómez Álvarez and Maldonado Bernal (2023) on specific technical shortcomings in Nayarit's vehicle inspection processes, which constituted the operational interface of the decree.

This interpretation has direct policy implications: if the under-execution gap is an indicator of bureaucratic capacity, then the design of future similar instruments should include explicit

components to strengthen the spending programming capacity of recipient municipalities. In line with Beltrán et al. (2025), the heterogeneity in municipal outcomes within the state of Nayarit itself Tepic executed 100% of its resources, while Del Nayar executed barely 40% suggests that the gap is not uniform and stems from differences in local technical capacity.

The theoretical implications extend beyond the case of Nayarit. If the institutional *bypass* mechanism operates on a recurring basis, the analysis of subnational fiscal sustainability must incorporate an analytical category absent from existing frameworks: *regulatory alignment capacity*. This capacity determines a subnational government's ability to convert federal decisions into its own revenue without altering its permanent tax structure. The absence of this category explains why assessments of fiscal dependence among Mexican states are often incomplete: they measure the size of transfers but not the scope for para-formal fiscal expansion that the states themselves generate through regulatory alignment.

Conditional Generalization: Scope and Limits of the Mechanism

The findings are conditionally generalizable. The institutional *bypass* mechanism operates under a specific set of structural conditions, the absence of which limits or nullifies its functioning: (1) the existence of a subnational tax whose tax base is linked to a category of goods over which the federal government retains relevant regulatory authority; (2) the federal decree must effectively generate an increase in the volume of formalized transactions at the subnational level; and (3) the subnational tax administration must possess the operational capacity to absorb the atypical increase in workload.

Conversely, the mechanism does not apply or applies only marginally when: (a) the subnational tax has a completely endogenous tax base; (b) the federal decree operates on informal markets whose formalization does not result in legal acts subject to taxation by the state; or (c) local institutional capacity is so limited that the processing cost exceeds the expected revenue benefit. Furthermore, the validity of the concept is stronger in federal systems with a high reliance on revenue-sharing, such as Mexico's, where limited formal tax autonomy incentivizes subnational governments to explore alternative avenues for generating revenue.

Sixteen non-border Mexican states share Nayarit's structural profile federal dependence exceeding 80%, own-source revenue below 10%, and inclusion in the decree which confers on the identified mechanism theoretical generalizability for this group of states, moderated by their specific institutional absorption capacity.

Conclusions

This article demonstrated that the 2022 vehicle regularization decree functioned in Nayarit as an institutional *bypass* mechanism within Mexico's incomplete federalism: it allowed the state to raise $108.51 million in additional resources $77.17 million via earmarked transfers and $31.34 million via own-source revenue without altering the local tax structure or the architecture of transfer dependency. This finding reveals that, in contexts of incomplete federalism, fiscal diversification can stem from the strategic exploitation of temporary federal instruments through institutional coupling processes, and not necessarily from structural reforms of local revenue-raising powers. The 39.4% under-execution gap introduces the variable of *institutional absorption capacity* as a mediating factor between the availability of extraordinary resources and their effective conversion into public spending. This variable, absent from macroeconomic analyses of the decree, helps explain the heterogeneity of results among municipalities within

the state itself and offers a plausible explanation for the heterogeneity among states at the national level.

There are three policy implications. First, the design of future formalization decrees should incorporate components to strengthen municipal spending programming capacity, especially in small and rural municipalities. Second, the decree's incentive structure which establishes a direct link between the funding vehicle and the project in the municipality of origin proved effective in encouraging voluntary compliance and should be replicated in similar instruments. Third, data on under-execution should be systematically reported as an indicator of institutional performance, and not merely as residual financial data.

The study's limitations are evident: the analysis is restricted to a single fiscal year and a single municipality, which precludes causal inferences regarding a counterfactual scenario. The estimate of own-source revenues is based on the standard cost assumption under the Revenue Law, without considering possible exemptions. The resulting research agenda includes: a comparative analysis among the sixteen participating non-border states; longitudinal monitoring of post-decree revenue collection trends to assess whether formalization generated a permanent tax base; and qualitative studies on the determinants of the absorption gap in municipalities with the lowest execution rates.

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University-Business Collaboration and Employability in Ecuador: A Systemic Analysis of Gaps, Models, and Perspectives for Industry 5.0

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Introduction

In the context of the Fourth Industrial Revolution and the emergence of Industry 5.0, the employability of college graduates has become a critical indicator of the relevance and quality of higher education. While Industry 4.0 prioritized the digitization and automation of processes, Industry 5.0 reorients the production paradigm toward environmental sustainability, system resilience, and the centrality of the human being in interaction with advanced technologies (Breque et al., 2021; Ivanov, 2022). This shift in purpose requires higher education institutions (HEIs) and businesses to coordinate efforts to train professionals with hybrid profiles that integrate technical, digital, green, and socio-emotional competencies (World Economic Forum, 2023; OECD, 2022).

In Ecuador, this transition takes on a particular sense of urgency. Recent data reveal that seven out of ten college graduates are unable to enter the formal labor market, while overqualification affects four out of ten young professionals, rising from 24% in 2007 to nearly 40% in 2024 (Carriel et al., 2026; El Mercurio, 2026; National Assembly, 2025). This disconnect between academic offerings and labor market demand highlights structural flaws in the mechanisms linking higher education institutions and the productive sector. Added to this is the fact that 74% of university degree programs fall within the social sciences, while only 7% are in engineering and 4% in technology and innovation (National Assembly, 2025), creating a significant curricular mismatch.

Given this scenario, this paper aims to address the following research question: How can collaboration processes and projects between HEIs and businesses effectively contribute to increasing the employability of graduates in the Ecuadorian context?

The objective of this chapter is to analyze how collaboration processes and projects between higher education institutions and the business sector can contribute to increasing graduate employability in Ecuador; based on this analysis, a systemic model of collaboration focused on employability within the framework of Industry 5.0 is proposed.

To address this topic, this study conducts a systematic analysis of the literature and the Ecuadorian regulatory context, structured into five sections. A theoretical analysis is carried out that articulates the concepts of employability, university-business collaboration, and Industry 5.0. The methodology outlines the design of the literature review and contextual analysis based on the results obtained from the map of competencies related to Industry 5.0 employability, the evaluation of the effectiveness of collaboration tools, and consideration of the specific

characteristics of the Ecuadorian ecosystem, integrating the findings into the regulatory and practical spheres.

Based on this background, a systemic collaboration model for Employability 5.0 is proposed.0, consolidating the necessary integration of the government, higher education institutions (HEIs), and the productive sector to achieve effective and sustainable industry-academia collaboration outcomes that guarantee employment for university students through better alignment of professional competencies with the curriculum and the expansion of technical profile development in line with the needs of the professional field and the Ecuadorian ecosystem.

Employability and University-Business Linkages in the Context of Industry 5.0: Foundations and Problematic Situation

This study is based on the central proposition that: university-business collaboration enhances graduates' employability only when it is organized as a system with stable funding, recognition of non-formal learning, and tripartite governance rather than as isolated projects.

Employability has been conceptualized from various perspectives throughout the 20th century, shifting from dichotomous and sociomedical approaches to interactive and systemic perspectives (Gazier, 2001). This evolution reflects the growing recognition that people's ability to enter, remain in, and advance in the workforce is not an exclusively individual attribute, but rather emerges from the interaction between personal factors, contextual circumstances, and labor market structures.

From a systemic perspective, employability is defined as "an individual's relative ability to enter, remain in, and advance in the workforce in order to fulfill their aspirations, which arises from the interaction between the individual and their personal factors, personal circumstances, and external factors" (Jiménez-Ulate, 2022, p. 37). This definition, based on the interactive model proposed by McQuaid and Lindsay (2005), underscores the multidimensional and dynamic nature of the construct, in which individual factors (skills, qualifications, attributes), personal circumstances (family situation, caregiving responsibilities), and external factors (economic policies, labor market characteristics, support services) interact in a recursive manner.

In the context of Industry 5.0, employability faces new demands. Studies by the World Economic Forum (2023) and the OECD (2022) agree that the labor market demands hybrid profiles that combine digital skills (data analytics, artificial intelligence, IoT), green skills (design for circularity, resource management), and social-emotional skills (critical thinking, creativity, effective communication, collaborative work). These competencies cannot be developed exclusively in the classroom; they require authentic learning experiences in real-world production environments (Mitchell et al., 2021; Lagorio & Cimini, 2024).

University-Industry Partnership Models

The relationship between universities and businesses has been theorized through various models that have evolved in complexity and scope. Sábato's triangle model (Sábato & Botana, 1986) was pioneering in Latin America, positing the interrelationship between the " " the State, scientific-technological infrastructure, and the productive structure as a necessary condition for technological development.

Subsequently, the innovation systems model (Lundvall, 2016) broadened this perspective by incorporating interactive learning as a central mechanism of innovation, distinguishing between

narrow approaches (based on R&D) and broad approaches (based on *"learning by doing, using, and interacting"*).

The triple helix model, in its Version III (Etzkowitz & Leydesdorff, 2000), constitutes the most elaborate framework for understanding contemporary linkages. This model proposes that innovation arises from the overlap of institutional spheres (university, business, and government), generating hybrid organizations that combine functions from all three helices. Version III emphasizes the dynamic and evolutionary nature of these interactions, recognizing that bilateral relationships represent a transition toward trilateral relationships in the form of an upward spiral (Espíndola et al., 2022).

In the Latin American context, the application of these models faces structural limitations. Espíndola et al. (2022) document that, although the theoretical frameworks exist in the region, their practical implementation is hindered by industrial underdevelopment, low investment in R&D, the predominance of SMEs with limited absorption capacity, and the weakness of university research. In Ecuador, these limitations are exacerbated by the fragmentation of the productive sector and the absence of public policies that encourage sustained collaboration between academia and the productive sector (Casanova-Villalba et al., 2025).

Engagement Tools and Evidence of Impact

The specialized literature has identified various collaboration instruments with proven potential to improve employability. Among these, the following stand out:

- Dual training: Combines theoretical education at a higher education institution with practical training in a company. Evidence shows that graduates of the dual system have significantly higher employment rates. In Ecuador, 96% of graduates from the dual system have been hired by the companies where they completed their training, and they achieve productivity levels up to four times higher than those of traditional education (National Assembly, 2025).
- Learning factories: Learning environments that simulate real-world production conditions, allowing students to develop transferable skills in authentic contexts. European studies report increases in employability rates of 10–25% for participants in intensive practical training programs (EIT Manufacturing; BRIDGES 5.0).
- Pre-professional placements and internships: Learning activities focused on applying knowledge and developing professional competencies in organizational settings. In Ecuador, the Academic Regulations (2022) stipulate that pre-professional internships must align with learning outcomes and the graduate profile, allocating a minimum of 240 hours for work placements and 60 hours for community service placements.
- Microcredentials: Short-term certifications that recognize specific knowledge and skills in a given area, enabling a flexible and targeted update of competencies. In Ecuador, the Council for Higher Education (CES) promotes training sessions on the design and implementation of micro-credentials, and the Pontifical Catholic University of Ecuador (, PUCE) has taken the lead in their implementation (CES, 2025; PUCE, 2025).
- Business incubators and *spin-offs*: Mechanisms that facilitate knowledge transfer through science- and technology-based entrepreneurship. In Ecuador, initiatives such as "Incubar" and "Créame" have shown progress, albeit with structural limitations (Casanova-Villalba et al., 2025; Pineda et al., 2011).

The reviewed literature reveals four significant gaps that limit the understanding and effectiveness of university-business linkages for employability in Latin American contexts:

First, most impact studies originate from European contexts or countries with high levels of R&D investment, which limits their generalizability to emerging economies with productive sectors dominated by SMEs and low capacity for technology absorption (Espíndola et al., 2022; CAF, 2025).

Second, there is a shortage of longitudinal evaluations that measure the impact of university-industry collaboration on graduates' career trajectories in the medium and long term. Most studies are limited to short-term measurements or subjective perceptions of employers and graduates (Varela, 2024; Rodríguez et al., 2010).

Third, the literature shows weak integration between placement models and competency frameworks for Industry 5.0. Although the need for hybrid profiles is recognized, there are no operational models that articulate the development of technical, green, and socio-emotional competencies through specific industry-academia collaboration mechanisms (Lagorio & Cimini, 2024; Ghobakhloo et al., 2023).

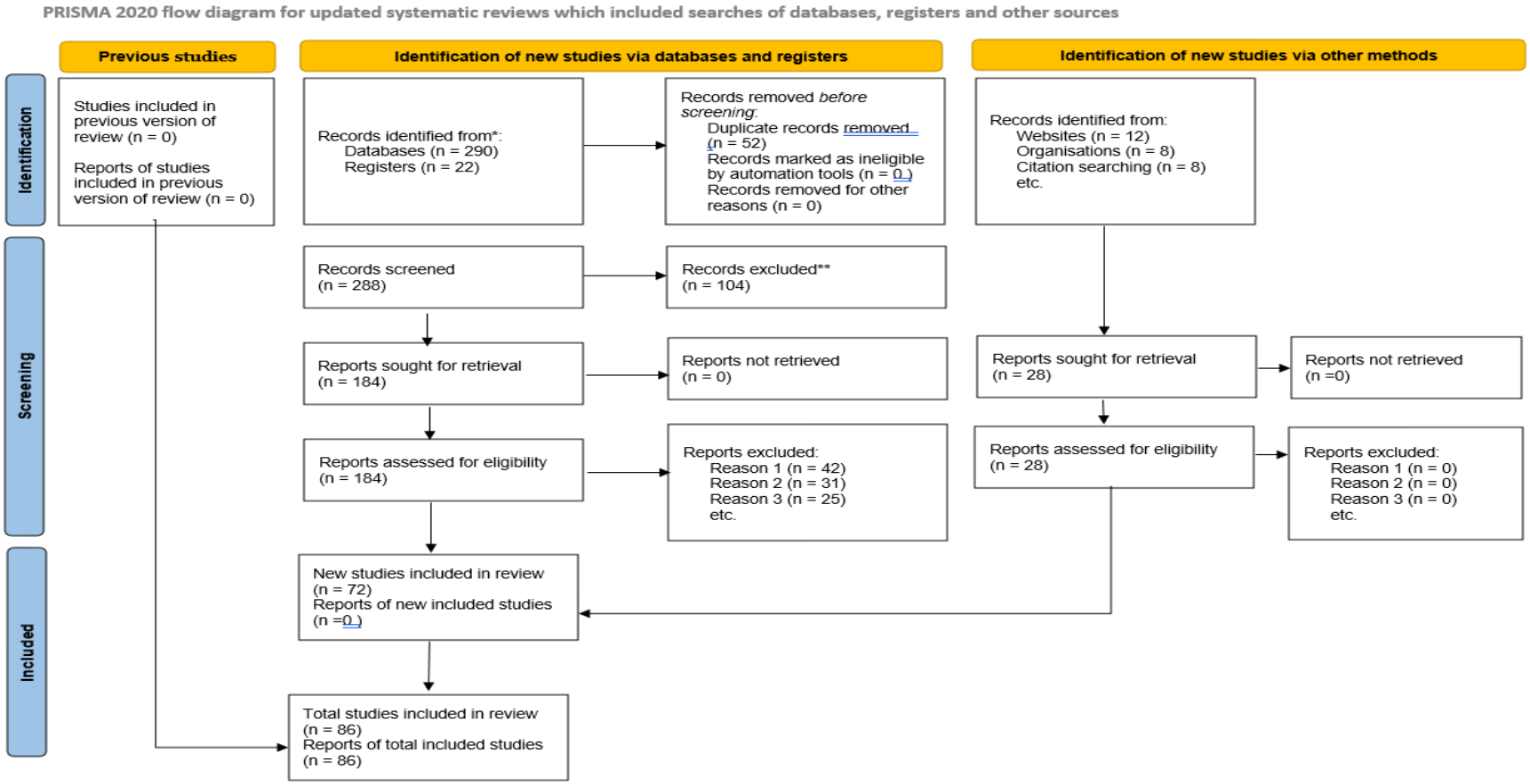
Fourth, the region lacks regulatory and institutional frameworks for the recognition of non-formal certifications (micro-credentials) and the validation of competencies acquired in workplace contexts. This absence limits the portability and market value of credentials obtained through industry-academia collaboration mechanisms (OECD, 2022; Orman et al., 2023).

Methodological Approach and Findings: Competencies, Instruments, and the Ecuadorian Ecosystem

The study adopts a qualitative design based on critical literature review and contextual analysis, following the PRISMA guidelines for systematic reviews (Moher et al., 2009; Varela, 2024).

The literature search was conducted in the Scopus, Web of Science, Google Scholar, OECD iLibrary, EBSCO, and Redalyc databases, using the following keywords: "Industry 5.0," "employability," "university-industry collaboration," "learning factories," "micro-credentials," "higher education," "Ecuador," "university-business collaboration," "employability," and combinations of these using the Boolean operators AND and OR. Documents published between 2020 and 2025 were included, with priority given to empirical studies, systematic reviews, and reports from international organizations. Additionally, Ecuadorian institutional documents (SENESCYT, CES, CACES, MAATE) and current regulations (LOES, Academic Regulations) were incorporated.

Figure 1. *PRISMA 2020 database review diagram*

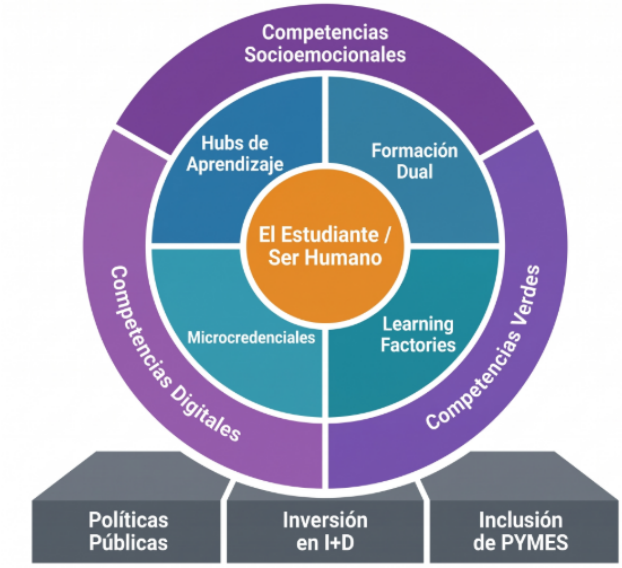


Note. The diagram illustrates the process of identification, screening, eligibility assessment, and inclusion of the documents analyzed in the review, using the template established by PRISMA. Available at: PRISMA 2020 Flowchart PRISMA Statement

Tensions, Lessons Learned, and a Systemic Model of Engagement

The proposed Systemic Model for Employability 5.0 views the human being as the fundamental focus of technology education, promoting effective collaboration among the government, higher education institutions, and businesses. The proposal integrates (see Figure 2) digital, social-emotional, and green competencies through key instruments such as dual training and learning hubs. Public policies, investment in R&D, and the inclusion of SMEs form part of the ecosystem that underpins this approach, thereby recognizing the importance of and the necessary coordination between the business sector, government, and HEIs.

Figure 2. Systemic Model of Linkages for Employability 5.0



Note: Prepared by the authors with support from the Gemini Notebook AI (unpublished infographic).

Competency Map for Employability in Industry 5.0

The literature review identified three sets of competencies that graduates must develop to be employable in the context of Industry 5.0:

Technical competencies: Data analytics, fundamentals of applied artificial intelligence, IoT, predictive maintenance, collaborative robotics, and cyber-physical systems. These competencies cut across productive sectors and form the basis of advanced digital literacy (World Economic Forum, 2023; Ghobakhloo et al., 2023).

Green or sustainable skills: Design for circularity, resource management, life-cycle assessment, energy efficiency, and clean production. Ecuador's National Strategy for an Inclusive Circular Economy (MAATE, 2024) provides a framework to guide training in these skills, although its implementation in the university curriculum is still in its early stages.

Social-emotional competencies: Critical thinking, creativity, effective communication, collaborative work in interdisciplinary settings, leadership, adaptability, and digital ethics. A study of 3,358 graduates from the Universidad Politécnica Salesiana (Cuenca) revealed that more than 90% of graduates remain in operational positions, and only 5% reach tactical o -level

management positions, highlighting significant gaps in the development of leadership and management competencies (MDPI, 2025).

The integration of these three domains produces hybrid profiles that are in high demand by companies that focus their strategy on sustainability and innovation. However, the study by Izaguirre and Sáenz (2022) on the competencies sought by Ecuadorian employers in administration, international business, and marketing programs found that soft skills (ethics, teamwork, critical thinking) are valued more highly than specific competencies, suggesting that employers prefer academic training to focus on the development of values and social skills, leaving specific knowledge to on-the-job training.

Effectiveness of Placement Tools

Table 1

Career placement programs and evidence of their impact on employability

Program	Mechanism	Evidence of Impact	Ecuadorian Context
Dual training	Combination of theory and business practice	96% job placement rate; 4x higher productivity	Leader in the Americas; 5,000+ graduates; 200 partner companies
Learning factories	Simulation of production environments	10–25% increase in employability rates	Isolated initiatives; no systematic evaluation
Pre-professional internships	Application of knowledge in real-world settings	Improvement in transferable skills	Regulated by the Academic Regulations; inconsistent implementation
Micro-credentials	Certification of specific skills	Immediate improvement in employability	In the early stages of implementation; lack of formal recognition
Incubators/Spin-offs	Technology-based entrepreneurship	Job creation and technology transfer	Limited initiatives; structural barriers

Source: Prepared by the authors based on National Assembly (2025); Lagorio & Cimini (2024); OECD (2022); Casanova-Villalba et al. (2025).

Table 1 summarizes the evidence on the effectiveness of the main industry-academia collaboration instruments. Dual education stands out as the mechanism with the strongest evidence in the Ecuadori l context: 96% of graduates from the dual education system have been hired by the companies where they completed their training, and they achieve productivity levels

up to four times higher than those of traditional education (National Assembly, 2025). This model, promoted by the Ecuadorian-German Chamber of Commerce, operates in 19 provinces and more than 20 cities, with the participation of nearly 200 companies in strategic sectors such as aquaculture, floriculture, and food production.

However, the implementation of other initiatives faces significant limitations. *Learning factories* and open innovation spaces are still in their infancy and lack systematic evaluations of their impact. Pre-professional internships, although regulated by the Academic Regulations (2022), are implemented inconsistently and do not always guarantee high-quality experiences. Microcredentials, although promoted by the CES and with pioneering initiatives at the Pontifical Catholic University of Ecuador (PUCE), lack a regulatory framework that guarantees their formal recognition and value in the labor market. Incubators and *spin-offs*, such as the model proposed by Casanova-Villalba et al. (2025), face structural barriers related to university leadership, cooperation policies, and market dynamics.

Assessment of the Ecuadorian Ecosystem

An analysis of the Ecuadorian context reveals a mixed picture, with significant regulatory progress but persistent structural limitations.

Regulatory and Institutional Framework

Ecuador has a regulatory framework that, in principle, promotes university-business partnerships and employability. The Organic Law on Higher Education (LOES, 2018) establishes engagement with society as a core function of higher education institutions, and the Academic Regulations (CES, 2022) govern pre-professional internships, dual training, and continuing education. CACES (2023) has developed an external evaluation model that includes specific indicators for engagement with society and graduate employability.

However, the implementation of this regulatory framework faces challenges. The CACES Institutional Quality Policy (2022) emphasizes self-reflection and continuous improvement, but accreditation processes still fail to sufficiently incentivize effective engagement with the productive sector. The LOES and the RRA establish requirements for pre-professional internships, but do not guarantee that these are of high quality or that they are aligned with the real needs of the labor market.

These gaps in coordination are not the result of an isolated regulatory deficiency but stem from structural limitations deeply rooted in the country's institutional, economic, and educational ecosystem. At the institutional level, the governance of engagement involves a multitude of actors, including the Secretariat of Higher Education, Science, Technology, and Innovation (SENESCYT), the Council for Higher Education (CES), the Council for Quality Assurance in Higher Education (CACES), sectoral ministries, decentralized autonomous governments, and business chambers whose responsibilities and implementation timelines are not always synchronized, as evidenced by the CES (2026), which generates bureaucratic inertia and delays the implementation of policies across the country.

Investment in R&D: Investment in research and development in Ecuador is less than 0.5% of GDP (SENESCYT, 2023), well below the OECD average (2.7%) and that of the most advanc r Latin American countries. This limitation restricts the capacity of higher education institutions (HEIs) to maintain laboratories, research centers, and technology-intensive outreach projects.

Productive Sector: SMEs account for more than 90% of Ecuador's productive sector (INEC, 2023). Most of these companies lack the resources to enter into R&D contracts or to offer high-quality,

structured internships. This situation limits the demand for innovation projects and highly qualified professionals.

Curricular Mismatch: 74% of university degree programs fall within the social sciences, while only 7% are in engineering and 4% in technology and innovation (National Assembly, 2025). The mismatch between academic offerings and labor market demands is one of the most visible manifestations of the disconnect between higher education and Ecuador's productive sector. According to data from SENESCYT (n.d.), 27.4% of university graduates in a given year come from just 10 traditional degree programs, despite the growing shortage of technical talent (La Hora, 2026). This concentration of programs in fields such as education, social sciences, journalism, and law, among others, contrasts with the needs of a labor market that demands technical and technological profiles.

Overqualification and Unemployment: Overqualification in the workforce affects 40% of young professionals, and college graduates are 10.3 percentage points more likely to be overqualified than those with technical or technological training (El Mercurio, 2026). This situation is exacerbated in the formal labor market, which, as documented by Del Pozo Villafuerte and Brugués (2025), exhibits marked heterogeneity in educational returns depending on the type and ranking of the institution from which graduates come, highlighting institutional reproduction mechanisms that condition graduates' entry into the workforce. The figures become even more critical when one considers that youth unemployment stands at 9.5% (INEC, 2024), and seven out of ten college graduates fail to enter the formal labor market (National Assembly, 2025). This landscape creates an environment of low absorption of qualified talent and low retention of professionals, severely limiting the positive effects that university-business partnerships could have on employability and productive development (Díaz-Sánchez & Correa, 2024).

Relevant Initiatives and Experiences

Despite these limitations, there are initiatives that offer lessons for strengthening these partnerships:

Dual training: The model promoted by the Ecuadorian-German Chamber of Commerce has trained more than 5,000 young people, with a job placement rate of 96% (National Assembly, 2025). This model operates in strategic sectors and has been recognized as the most advanced in the Americas.

IDEIN Projects: The Catholic University of Cuenca has promoted applied research projects with a regional impact, aligning academia with the needs of the local community (Catholic University of Cuenca, 2025).

International Cooperation: The Technical University of Loja (UTPL) has developed international partnerships that facilitate the transfer of methodologies and participation in European networks of *learning factories* (UTPL, 2025).

Microcredentials: PUCE has implemented two types of microcredentials (cross-disciplinary and specialized), positioning itself as a pioneer in this field in the country (PUCE, 2025).

The reviewed evidence supports the conclusion that partnerships between higher education institutions and businesses are a key mechanism for increasing employability in the era of Industry 5.0, provided that initiatives are designed and implemented according to criteria of

quality, equity, and sustainability. However, an analysis of the Ecuadorian case reveals significant tensions that require critical reflection.

Dual training emerges as the approach with the strongest evidence of impact on employability. However, its reach remains limited: 5,000 graduates in a country that produces tens of thousands of university graduates annually. Furthermore, the model is concentrated in strategic sectors (aquaculture, floriculture, food production) and has not managed to scale up to areas such as services, technology, or the knowledge economy. This concentration raises the risk that dual training will perpetuate specialization in low-value-added sectors, rather than driving the transition toward Industry 5.0.

Microcredentials offer significant potential for the agile updating of skills, but their proliferation without standardization can create confusion in the labor market. Without validation frameworks that guarantee their quality and recognition, employers may be wary of inconsistent certificates. In Ecuador, the CES's initiative to promote training sessions on micro-credentials is a step in the right direction, but a regulatory framework is needed to establish minimum standards and quality assurance mechanisms.

One of the most concerning findings is the persistent disconnect between university research and the needs of the productive sector. Low investment in R&D and the weak absorption capacities of SMEs limit knowledge transfer. As Varela (2024) points out, university-business linkages have a significant impact on the production of scientific knowledge by increasing the relevance and applicability of research, but in Ecuador this potential has not been fully realized.

The findings suggest that the effectiveness of these partnerships depends not only on the quality of the instruments but also on systemic conditions: stable funding, regulatory frameworks that certify non-formal learning, practical learning infrastructures, and public policies that incentivize sustained collaboration. In Ecuador, these conditions are still insufficient. The National Strategy for an Inclusive Circular Economy (MAATE, 2024) provides a promising framework for guiding university projects toward sustainability, but its implementation requires effective coordination with the higher education system and the productive sector.

Finally, it is important to note the risk that strengthening industry-academia partnerships may benefit only universities with greater financial capacity and students with greater resources, thereby deepening the segmentation of the education system. Without compensatory policies that guarantee equitable access to quality industry-academia partnership opportunities, Employability 5.0 could become a privilege reserved for the few.

Conclusions

A systematic analysis of the contribution of industry-university partnerships to graduate employability in Ecuador identified four fundamental theoretical and practical gaps.

First, the absence of collaboration models adapted to the productive sector dominated by SMEs. Next, the weakness of mechanisms for assessing the impact of such collaboration on employability was identified; furthermore, a lack of regulatory frameworks for the recognition of non-formal competencies was noted; and finally, insufficient coordination between higher education, science, and innovation policies.

Dual training, particularly in Ecuador, shows outstanding results with 96% job placement rates and productivity levels four times higher. However, these successful experiences have not been scaled up or replicated in most higher education institutions and productive sectors.

In the Ecuadorian context, structural constraints such as low investment in R&D, the predominance of SMEs, curricular mismatches, and overqualification require effective public intervention that contributes to the transition toward Industry 5.0 through a systemic approach to public policy, moving beyond the logic of isolated and temporary projects.

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Cognitive Strategies for Legal Epistemic Training in Law School

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Introduction

The university, as a center of higher intellectual activity and a preserver, creator, and developer of culture, must achieve the appropriate reorganization and flexibilization of its processes as a means of fulfilling its mission. This is reflected in the various pedagogical models recognized throughout the history of education and in the didactic characterization of its human and non-human components, which demonstrates a transition in how the educational process is conceived from a "Pedagogy of Knowledge" to a "Pedagogy of Being"; from a traditional approach to a developmental one.

This foundation fosters an educational process based on learning: learning to know, by fostering understanding; learning to do, by developing competencies to influence the environment; learning to live together, based on the principles of human participation and cooperation; and learning to be, through a holistic education.

In this way, university education becomes a comprehensive and lasting experience, both cognitively and practically, which demonstrates a dialectical relationship between scientific epistemic education and the process of professional training.

The logic described is reflected, with its specific characteristics, in the training of legal professionals. Consequently, its development reveals the influence of various pedagogical models and their manifestation in courses of a legal-epistemological nature. These subjects particularly History of Law and Roman Law as integral parts of the curriculum face diverse challenges as a result of pedagogical and technological developments, shaped by the perspective taken regarding their importance, scope, and content.

Accordingly, this research aims to analyze the integration of legal epistemology with new cognitive strategies and the corresponding pedagogical knowledge. To this end, based on a historical, evolutionary, and legal analysis, a proposal for a cognitive strategy along with its system of actions is established as a means to update, refine, and ensure the curricular relevance of these subjects in the current training of lawyers.

Based on this analysis and in relation to the proposed objective, the following research question is posed: How can the integration of legal epistemology into current legal education be conceived to ensure the curriculum's updating, refinement, and relevance?

The research is based on a methodology that integrates the qualitative approach of the social sciences with methods specific to law. The qualitative approach is grounded in the social nature of legal relationships and facilitates the analysis of historical and current documents, programs, and regulations in the pedagogical and legal spheres, offering a holistic view of law as a complex social phenomenon.

At the same time, the importance of the modeling method in determining the actions of the proposed strategy is recognized. Similarly, methods specific to legal science contributed to achieving the objective, particularly those related to:

- Historical-logical: This approach provided a comprehensive view of the evolution of legal education across the different stages studied.
- Legal-theoretical: This facilitated the analysis of the economic, social, political, and cultural context underpinning the educational processes analyzed.
- Analytical-exegetical: This approach contributed to the internal analysis of the normative and pedagogical structures underpinning each of the models and trends within the research subject throughout human evolution.

Vocational Education: A Brief Epistemological Analysis

Vocational education is grounded in three determining factors that characterize and condition it: the anthropological factor, which recognizes the educable nature of human beings and their predisposition to develop knowledge, skills, and values; the teleological factor, which envisions educational goals and the purpose of education; and the methodological factor, as a system of actions guided by human rationality and effective teaching-learning strategies. These determinants are reflected in the various pedagogical models recognized and analyzed by other authors in different studies; therefore, the main ideas on this subject are outlined below (Alfonso Caveda and Alcívar García, 2022)

The widespread social adoption of education in the late 17th century laid the foundation for the so-called Traditional School, in which the state served as the guarantor of learning. This model views the teacher as a custodian of knowledge and teaching as "the transmission of established truths that summarize the experiences of previous generations" (Alfonso Caveda, 2010, p. 5) Consequently, it focuses on ensuring that students demonstrate mastery of the material through objective learning, and the educational process gains relevance when it succeeds in shaping "character with a humanistic and religious emphasis" (Vives Hurtado, 2016, p. 44)

In the second half of the 19th century, a new vision of learning emerged, based on the needs and interests of the learner through active teaching. The Escuela Nueva movement achieved, through structured content, active, experiential, and motivating learning that adapted to the learner's individual characteristics.

Learning by doing became central to this theory in its later stages, giving way to the well-known constructivist theory and its student-centered approach, in which students construct and interpret their own educational experiences. The educational process is considered relevant to the extent that it fosters meaningful learning.

Technological developments in the 20th century underpinned a new way of teaching and learning. The Technological School marked the beginning of programmed, efficiency-oriented learning, grounded in behaviorist psychology and characterized by the use of *mass media* in the school setting and learning through sophisticated machines designed to motivate students, tailor content to individual needs, and develop reproductive memory measuring the student's ability to reproduce knowledge rationally and efficiently.

The study of these theories became the starting point for one of the most important educational approaches of all time: the well-known Historical-Cultural Approach developed by Vygotsky, L. (1968) and his followers.

This theory, developed in the second half of the last century, successfully integrates the educational phenomenon in an innovative and holistic manner. It reinterprets the teaching-learning process from historical and cultural foundations, leading to the recognition of the individual as a social being by nature a product of society and an active participant in social relations.

The educational approaches outlined above are applicable to all professions, and therefore to legal education and, in particular, to courses in legal epistemology.

The Teaching of Law: Nature and Educational Models

The content of the teaching-learning process regarding legal phenomena demonstrates, as it evolves, transformations and adaptations designed to address the new challenges of higher education, as reflected in the various models of legal education. In this regard, numerous scholars on the subject stand out, such as Carnelutti and Canfux with their critique of traditionalist legal education (Carnelutti, 1944) , and the inability of traditional pedagogy to provide relevant tools for solving current problems in legal education (Canfux, 2000) ; Witker and his innovative methodology for teaching law (Witker, 2006); Encarnación Fernández and her analysis based on the paradigms of traditional, technocratic, and critical teaching (Fernández, E. 2016).

Traditional teaching is characterized by authoritarianism in the learning process. The professor serves as the center of communication, and the student as a passive recipient. It does not establish the skills that students must develop, which leads to the professor being valued more as *the subject of the teaching process than the students themselves* (Canfux, 2000). Teaching is conceived as the transmission of fixed truths, which prevents transformative learning.

Traditional legal education conceives of law as a mere set of rules aimed at regulating the conduct of citizens in a given society. Essential issues such as the historical foundations of legal institutions and the analysis of the socio-legal context are omitted, as they are considered unnecessary in an education based on a conception of law that is independent of social relations, aseptic, and neutral. Legal practitioners, in their teaching roles, *promote legal ideology rather than the science of law,* thereby perpetuating an institutional context subordinate to a *hegemonic apparatus of global political domination* (Witker, 2006).

The second model focuses on the stimulus–response relationship and is based on the well-known method of programmed instruction and the psychological school of behaviorism. Skill development in this model is conditioned by the one-way delivery of content. Learning is reduced to passively receiving knowledge through technological stimuli designed to motivate in order to reproduce it. Theoretical and creative thinking is not fostered in students.

The study and understanding of legal phenomena are explained from positivist foundations, which prevents a comprehensive and critical analysis of essential dialectical categories such as society, rights, legal effectiveness, efficiency, and legitimacy.

The third paradigm emerges as a reaction to the two previous positions. Its aim is to achieve *a more conscious and meaningful teaching practice* (Witker, 2006, p. 224). The educational phenomenon is explained not only from the perspective of the school but also from that of society, based on the principles of cooperation, respect, and equality. Teaching takes on a transformative role and highlights the importance not only of cultural heritage but also of *the ability to think, analyze, and draw conclusions based on that body of knowledge* (Hernández Díaz, 2000).

The critical pedagogy model poses major challenges for the teaching of law. Its acceptance presupposes an epistemological break that goes beyond normativist conceptions, in that it recognizes law's nature as a complex social phenomenon one that is markedly diverse and influenced by economic, political, social, and cultural factors.

Based on these premises, legal education will be shaped by a body of legal knowledge that, once processed and operationalized, can be applied to real-world professional contexts and through instruction, education, and professional development enhances the capacity to transform the legal system and adapt it to changing social needs.

The well-known triadic theory of the legal world, advocated by various authors such as Recaséns Sichés, Cossío, Goldschmidt, Bulté, and Witker, among others, and analyzed by Reale in his essential work of the same name, * , is grounded in the idea of law as justice (*dikelogy*) and, therefore, in the service of human fulfillment, which determines the existence of a three-dimensional "legal world" or body of legal knowledge identified from three interdependent perspectives or dimensions: the Science of Law, the Sociology of Law, and the Philosophy of Law.

The Science of Law deals with the *normative dimension* and issues related to its structure; therefore, it studies the current normative system, and its object is the process of interpretation, application, systematization, and feedback regarding existing law. Legal Sociology reflects the *social dimension* and focuses on effective, socially accepted law, as well as the verification of the value system incorporated by society. For its part, the Philosophy of Law addresses the *evaluative dimension* of law and issues concerning the foundation of law. Its object is justice (Fernández, E. 2016).

However, within the theoretical framework's dimensional structure, the first of these dimensions is seen as responsible for integrating the social and the philosophical. In this context, and based on its object, the science of law undertakes the task of constructing fundamental legal institutions and concepts and of systematizing the legal (*normative*) order. This means that it is grounded in a theoretical-practical activity. To the extent that it deals not only with norms but also with their application by legal practitioners, it investigates and reports on the effectiveness of the law (*social).* Finally, it also addresses the system of values incorporated into positive law (*axiological).*

The analysis presented here supports a new vision of the teaching and learning process regarding legal phenomena and the assumptions that contextualize it, recognizing (Alfonso Caveda and Alcívar García, 2022):

- Adopting a broad, inclusive, and perfectible concept of law;
- Recognizing an axiological conceptual framework and a system of principles underpinning the norms within the legal system;
- Integrating contemporary studies on legal and epistemological theory with the factors and components involved in the implementation of legal norms and their integration into broader social contexts.

In this way, we can foster a dynamic legal education process centered on the development of knowledge, skills, and values within a socio-communicative context that ensures professional learning, transformative action, and a conscious process that addresses what, how, and why we learn all informed by the democratic, dialogical, and scientific nature of the teaching-learning process and the objectives of each subject comprising the curriculum.

Embracing this approach implies recognizing a curricular logic that promotes education grounded in the critical study of the historical, evolutionary, and epistemological foundations of

law, alongside its theoretical and normative content. Consequently, it shapes the organization of the curriculum, which must incorporate levels of general, foundational, and professional education that, in an ascending manner, fulfill the stated graduate profile.

Critical Education Based on the Historical, Epistemological, and Professional Complexity of the Legal Phenomenon: Main Manifestations in the Americas

The above finds its practical foundation in the organization of courses their content, learning outcomes, and integration within a system of academic disciplines, some of which are epistemological in nature and others vocational. The former include the previously mentioned: History of Law, whose focus is the evolutionary development of law as a complex social phenomenon within the major human socioeconomic contexts; and Roman Law, which recognizes the richness and importance of Roman civilization as the foundation of the Roman-French legal system to which the vast majority of Latin American and Western European countries belong.

Both courses place students within a historical-legal context that enables them to understand the relationship between law and the political, economic, and social spheres, as well as its impact on the epistemological and normative evolution of the legal phenomenon. In turn, this helps future professionals understand the origins of their field.

Thus, it must be recognized that, from the very beginnings of legal education, there have been subjects that have always followed a learning approach integrating epistemological foundations with a practical component, depending on the student's level of education. This phenomenon has its origins in the educational systems of ancient Rome, spread throughout Europe as a result of the development of European common law, and reached the Americas through the process of colonization.

The historical context of Roman civilization reveals a gradual evolution in the conception of law as a phenomenon intertwined with politics and growing economic influence; *thus, the prevailing political ideology at any given historical moment determined the creation of law and, consequently, its teaching* (Agudo Ruíz, 2010). Thus, legal education oscillated between the supremacist pontifical monopoly *the custodians of tradition and the formalities of procedural and contractual acts* (Fernández de Buján, 2008) the process of secularization with the publication of the Twelve Tables and the ius civile Flavianum, which increased legal certainty and paved *the way for interpretatio among future generations of jurists* (Agudo Ruíz, 2010), and the emergence, during the Dominate period, of the first institutions of higher education.

Another hallmark of the period was the emergence of the first teaching methods: **audire**, oral instruction; **instituere**, the teaching of the theoretical and epistemological foundations of law; and **instruire**, for advanced-level students, consisting of work on procedural cases and the drafting of legal instruments. Justinian's reforms to legal education brought this long period to a close. The new vision contained in the Corpus Iuris Civilis demanded a fresh approach to teaching and learning, framed within a broad *constitutional reform of the culture and legal organization of the Roman state* (Agudo Ruíz, 2010).

With the fall of the empire, the 11th century marked the resurgence of Justinian Roman law as a subject of study in the first universities. This phenomenon took shape in Bologna and became the definitive development of European legal science, which drew upon Roman and canon law.

Both are considered the foundation of *the* European *ius commune*. Consequently, during the period under analysis, the epistemological foundations of legal studies which would later be assimilated in Latin America are recognized as *common cultural and organizational elements across diverse continents* (Masi, 2021).

The *novus orbis* quickly assimilated Roman concepts, whether as a result of *Spanish dictates governing relations among its people and with its indigenous subjects* (Hinestrosa, 2013) or due to the richness and practicality of its normative content. This adoption also shaped its unique continental epistemological character through the integration of indigenous institutions, serving as the foundation for what would become the Latin American legal system a result of the enduring identification of its content in university classrooms.

In line with the above, a review of curricula from different periods substantiates the influence described. Coinciding with the early centuries of Spanish colonization (16th–18th centuries), the following stand out: the second Constitution of the National University of San Marcos, which outlined the courses to be taught, including *"Prima y Víspera de Leyes" and "Instituta"* in 1576, based on Roman principles (Nizama Valladolid, 2015); the statutes of Judge Pedro Farfán from 1580, and his method of textual review and glossing; the study of Canon Law and Civil Law in the Viceroyalty of New Spain (1580), with two *law courses: "Code" and "Institutes"* (Adame Goddard, 2017), and that of New Granada (1710), taught by lecturers in Latin.

This approach took root in the first American universities, reflecting the teaching methods employed at the University of Salamanca since the 13th century, which in turn were derived from the University of Bologna itself; that is, the traditional study of the original texts of the Codex, the Instituta, and the Digestum organized throughout the years of training, during which instructors taught *the concepts, classifications, justifications, and interpretations that Roman jurists had applied to legal institutions* (Stringini, 2018).

The second period coincides with the spread of the Enlightenment in the Spanish colonies, spurred by French thought and the rise of the Bourbon dynasty. These new ideas reshaped ways of thinking and marked a shift in education particularly in teaching methods and curricula toward more scientific and humanistic approaches. It is not surprising that they became integrated into efforts to establish public universities as a means of breaking the iron-fisted clerical dominance.

The new academic proposals advocated for a return to the teaching of history and its institutions as a means of understanding domestic law. This aspect, essential to educational reform, reflects a new method of learning: conceptualizing current Spanish colonial law through the lens of Roman institutions. This form of comparative study established *a systematic connection between Spanish colonial law and Roman law* (Cellurale, 2007), facilitated an in-depth study of its political and legal history, and *incorporated Roman law predating Justinian* (Cortés Falla, 2003).

Various examples of curricula demonstrate this: the so-called *"Provisional and Interim Method for Studies to Be Observed by the Schools of Santafé…,"* by Moreno and Escandón, in effect from 1774 to 1779, and that of the Board of Studies convened by Viceroy Caballero y Góngora, drafted in 1779, both in New Granada; although the latter was less elaborate, as it omitted comparative studies.

The most recent period, from the 20th century to the present, is characterized by changes in teaching processes as a result of new scientific advances in pedagogy. Based on the logic outlined above, courses in epistemic formation manifest themselves in accordance with the perspective taken regarding their utility and educational objectives ranging from a purely historical and cultural view to a genuine theoretical, doctrinal, and legal-philosophical foundation that is essential for the comprehensive training of legal professionals. Given this reality, they face

the challenge, on the one hand, of adopting new learning strategies grounded in contemporary pedagogical theories and, on the other, of enhancing the understanding of their importance within the current educational and legal context.

An analysis of this idea reveals two essential, interrelated aspects. The first, of a pedagogical-didactic nature, involves adopting operational teaching components (methods, resources, formats, and assessment) as means of active motivation, thereby achieving meaningful learning which manifests itself in the learner's ability to apply what has been learned to new situations within the legal context. Thus, in contrast to traditional activities and practices for transmitting knowledge, other methodologies stand out that integrate cognitive, volitional, and affective elements into their approach within a motivated educational context centered on the development of the learner's personality.

The second aspect focuses on repositioning legal tradition as the foundation for the training of today's legal professionals. This foundational knowledge is essential for intellectual development *in the structural aspects of analysis and thought among contemporary legal professionals* (Cortiñas Barajas, 2024). Thus, within the framework of the professional training process, knowledge of legal epistemology constitutes the core foundation of professional practice.

Thus, the informational content of law, its categorical system, and learning methodologies must evolve in response to scientific developments, the needs of the workplace, and the social models to which we aspire as a human community. This should be the mission of all law schools: to produce professionals *with a dynamic perspective on legal phenomena, equipped with the intellectual tools that enable them to view the legal system holistically and to place their knowledge at the service of the community* (Witker J. A., 2019), in pursuit of a more just and equitable society.

Cognitive Strategies as Modernizing Actions in Legal Epistemic Education: A General Proposal for Their Implementation.

The concept of learning strategies is inherent to the educational process. As old as education itself, these strategies evolve alongside it, taking into account the instructional and educational goals pursued at each historical moment. Ancient Greece and Rome incorporated them into their teaching methods as an ideal means for retaining and storing information an essential skill for public service at the time. For their part, the main schools of European thought have revisited them in the context of sociocultural and scientific transformations, grounded in psychological theories and focused primarily on students' academic performance.

Thus, these strategies are interrelated with the learning process, since acquiring knowledge involves *performing specific mental activities that must be properly planned to meet expectations* (Beltrán Llera, 1998). This determines a series of logical steps or algorithms for learning acquisition that materialize in a system of strategies and a specific activity. This activity is driven by a *motive within which a need takes shape as an object* (Leontiev, 1981)

In turn, the motive provides direction and meaning to the activity, which facilitates the learner's identification with their profession and with their successful performance. In this logical process, activity and motive generate know-how, and this development of skills results from acting consciously with knowledge, based on what has already been learned and using the appropriate means. In this way, learning becomes conscious and meaningful.

Along these lines, authors such as Gagné (1974) and Shuell (1988), among others, identify sequenced learning processes (Gagné and Briggs, 1976) centered on the phases of selection, organization, and elaboration of information, giving rise to various learning strategies determined by needs and motives (Shuell, 1988) . This variety of possibilities, grounded in pedagogical, psychological, and behavioral principles, explains the different interpretations of the term under analysis.

Monereo conceptualizes them as processes that facilitate the assimilation of information entering the subject's cognitive system from the outside, which involves managing and monitoring the input, labeling categorization, storage, retrieval, and output of data (Monereo, 1990).

Muria Vila defines them as planned behaviors and physical activities that select and organize cognitive, affective, and motor mechanisms for a specific purpose (Muria Vila, 1994). For his part, Beltrán, a Spanish educational psychologist, defines them as mental operations or activities that facilitate and develop the various processes of school learning (Beltrán Llera, 1998).

Díaz García identifies them with the incorporation of new knowledge into prior knowledge, in order to encode, understand, and recall information (Díaz-García et al., 2023). For Peñarreta Aldaz, they are a set of activities that lead to learning by intentionally, organizedly, and systematically drawing on comprehension, memory, and the recall of information and knowledge (Peñarreta Aldaz et al., 2024).

In summary, cognitive strategies are recognized as an organized and planned process that facilitates, within the context of the teaching-learning process, a system of personal and collective actions for the effective completion of a task. This nature allows them to be applied in any educational and professional program. Within the scope of this study, they revitalize the study of legal epistemological foundations and their importance in the training of 21st-century legal professionals.

In line with the above, the development of appropriate cognitive strategies in the training of legal professionals must take into account the global and contextual needs of the educational process and be grounded in innovative pedagogical foundations.

The first of the aforementioned aspects is grounded in the so-called Sustainable Development Goals (SDGs), adopted as a plan of action for *people, the planet, and prosperity* with the aim of strengthening *universal peace within a broader concept of freedom*. The proposal is based on the interdependence of its goals, recognizing that *sustainable development cannot be achieved without peace and security, and peace and security are at risk without sustainable development* (General Assembly, 2015)

Goal 4 takes on particular relevance in this research, as it aims to *ensure inclusive and equitable quality education and promote lifelong learning opportunities for all*; through its targets, it becomes the ultimate goal to be achieved in the development of cognitive skills that enable inclusive and lifelong learning.

Regarding the second aspect, and in the context of training future legal professionals, it is necessary to mention current studies on the phenomenon of neurolaw. This discipline, which finds its pedagogical and psychological foundations in the studies of William James (James, 1890) on neurodidactics and the principle of neuroplasticity, emerged at the end of the last century and emphasizes the impact of *the social environment, family, and culture* on learning, offering a new approach to the educational phenomenon to *enhance skills and talents* (Mora, 2013)

Along these lines, neurolaw relates neuroscientific developments to legal phenomena and explores how the *brain's functioning finds jurisprudential significance* (Camargo and Ried, 2021). In this sense, the integration of cognition, action, consciousness, emotion, and reason is perceived differently by each individual who learns and acts. From a neurolegal perspective, this idea compels a reevaluation of many legal principles and normative constructs that were accepted as absolute truth by several generations of legal professionals.

This new discipline relativizes legal knowledge by reframing the analysis of the nature of *legal facts, unlawful conduct, prior knowledge, and understanding of the law all of which are linked to volition and the freedom of decision and action* (Sandoval, 2012). Thus, from the perspective of this study, it becomes a necessary tool that prioritizes the experiential and the personal perspective on knowledge, offering specific insights into the importance, scope, and relevance of the epistemological and the historical, as well as their manifestations in the creation and application of law.

In summary, the effectiveness of cognitive strategies of an epistemic nature will depend on their ability to adapt to new legal and pedagogical contexts, as a means of fulfilling their dual educational function: as a vehicle for a universal legal culture and as a tool for understanding future challenges in the practice of the profession (Rojas Quintana, 2024) . Therefore, the teaching-learning process becomes the ideal vehicle for this task. Its didactic structure must take into account starting with the proper organization of the curriculum the relevant cognitive strategies and learning environments necessary for understanding legal phenomena.

In this regard, the pedagogical integration of cognitive strategies with course content enables students to develop professional skills and logical algorithms to become familiar with the *conceptual terminology of law;* to understand *the systematic logical structure of legal institutions; and* to contribute *to the development of a legal mindset* (Nizama Valladolid, 2015)

The algorithmic logic of the learning process presented by Professor Beltrán constitutes, from our perspective, a valid approach to learning epistemic legal content. The professor defines strategies as mental actions based on external information that students process according to their experience and prior knowledge, guided by an objective aimed at achieving a goal (Beltrán Llera, 1998)

Cognitive Strategy for Legal Epistemic Knowledge

In the context of this research, the following phases, actions, and instructional activities of a legal-epistemological nature are assumed:

Phase 1. Conceptual terminology of law.

Strategic Action: Awareness

This represents the initial framework of learning. It consists of three processes: motivation, emotion, and attitudes. This initial process largely determines the success of learning. Motivation, as a psychological process, involves, on the one hand, satisfying the learner's physiological needs and, on the other, fostering positive motivation by creating expectations about new knowledge and even promoting them through *problematic situations situations that can be resolved with the help of the action the learner intends to perform* (Talizina, 2018). This fosters both positive emotions and a positive attitude toward new learning.

Instructional activities are designed to motivate students toward new knowledge through audiovisual materials on the history of various socioeconomic systems or specific periods within

them; geographical and physical analyses of civilizations and their impact on political, socioeconomic, and cultural development; presentations of significant laws or legal systems in different civilizations; and profiles of important jurists, politicians, and military figures from each historical period.

Strategic Action. Attention.

This is identified as the initial stage of learning. Motivation is its necessary prerequisite and operates at the sensory level. The selection, discrimination, and analysis of information will depend on established strategies, which determine *selective attention* and, therefore, *the type of information that will reach short-term memory* (Beltrán Llera, 1998).

In this phase, proper planning and organization of the activity are crucial; they govern the learning process, ensure the execution and verification of the action, and predict or modify success or failure (Solovieva and Quintanar Rojas, 2021). The student engages in the task of selecting and identifying the requested information.

Examples of instructional activities include the creation of concept maps and infographics, as well as the review of historical and legal documents.

Example of a teaching activity in Phase I:

Analysis of Significant Legal Frameworks in the Studied Socioeconomic Contexts

Objective: To explain the context in which the various legal codes were developed.

Procedure: In this activity, students work with different excerpts from the legal codes to explain the context, which helps them understand the causes of the codes' origin and development, as shown in the following structure:

Table 1: *Legal Codes and Context Analysis*

CIVILIZACIÓN	CUERPO LEGAL (Fragmento)	ANÁLISIS DEL CONTEXTO
Mesopotamia	Código de Hammurabi (aprox. 1750 a.C.) "Si un hombre acusa a otro hombre y le imputa un asesinato, pero no puede probarlo, su acusador será ejecutado"	Constituye la civilización atípica dentro del reconocido Modo de Producción Asiático, como resultado de sus condiciones geográficas y el temprano desarrollo comercial. Esto conlleva al desarrollo de un Derecho de mayor perfección, complejidad y tendiente a garantizar la seguridad jurídica de las relaciones político económicas y mercantiles.
Imperio romano	Flavio Pedro Justiniano. Corpus Iuris Civilis (527 y 565) Ulpiano, Reglas, Libro I (Digesto 1,1,10) "La justicia es el deseo constante y perpetuo de dar a cada uno aquello que le corresponde"	Constituye la época de mayor desarrollo técnico normativo de Roma. El complejo contexto socioeconómico y cultural desemboca en un proceso de recopilación normativa y de perfeccionamiento jurídico. Base del Sistema de Derecho Romano Francés.

Source: Author's own work

Phase 2. Systematic logical structuring of legal institutions.

Strategic Action: Acquisition

This phase builds on the information selection from the previous process and facilitates the actions of comprehension, retention, and transformation; as a result, the learner is able to make sense of and understand the information. *This is the most critical moment in learning the moment when the learner meaningfully constructs their knowledge* (Beltrán Llera, 1998)

In this process, the student processes information based on their own personal and experiential strategies. In this way, knowledge is transformed and internalized by the learner through their own cognitive process, which allows them to make it their own and thus meaningful.

In light of the above, the activities in this phase should be aimed at developing processes such as analysis and synthesis; identifying main ideas; organizing information; and gaining an initial understanding of professional research, among others. Consequently, instructional activities focus on characterizing different historical periods based on clearly defined indicators (economic, political, social, and legal context), analyzing the sources of law at each stage, and examining the structure of legal norms.

This will enable students to understand that the legal phenomenon and its sources are the result of a historical situation determined by the relations of production, political organization, culture, and the social classes involved in these processes, thereby allowing them to view law as a complex social phenomenon. In turn, it enables them to integrate key legal concepts such as the state, sources of law, political institutions, the legal system, customs, norms, and laws, among others.

Strategic Action: Personalization and Control.

Through this process, the learner takes responsibility for their own learning, ensures the validity and relevance of the knowledge acquired, and explores new frontiers beyond the established or conventional (Beltrán Llera, 1998). In this way, students will be able to apply what they have learned to similar situations involving different content.

This highlights the importance of incorporating the concept *of the Zone of Proximal Development* (Vygotsky, 1979) into the learning process as the space that exists between an individual's actual development and their potential development. Learning must therefore be oriented toward a future stage of development; only in this way can it become a source of development.

The clearest example in the context of the identified epistemic subjects is the ability to apply similar analytical indicators across different historical periods and their manifestation in legal sources. The following are highlighted as teaching strategies: the flipped classroom, gamification (Kahoot, Socrative, Genially, or Quizziz), and storytelling, defined as *the art of conveying events and connecting with the target audience through a story* (Cortés Román, 2024).

The last of these activities focuses on creating stories based on the course content, which requires students to understand the material and thus be able to structure it digitally. Cortés Román clearly defines the principles on which this approach is based: depth, immersion and world-building, continuity and seriality, subjectivity, and performativity (Cortés Román, 2024).

The instructor recreates a digital world where students interact with the course content, encountering legal situations related to different branches of law: civil, criminal, property, inheritance, and contracts, among others. In this way, students develop a legal mindset, understand *the human side of the legal system, and realize that law is not solely about legal rules, principles, and procedures* (Blissenden, 2010)

Example of a teaching activity from Phase II:

Characterization of the different periods of Roman civilization

Objective: To characterize the different historical periods of Roman civilization based on general common indicators.

Development: This activity uses various general indicators that can be applied specifically to each historical period. In turn, students visualize and understand their impact on the development of law through its formal sources, as shown in the following structure:

Table 2: *Indicators and Manifestations Across Historical Periods*

CIVILIZACIÓN ROMANA				
INDICADOR	PERIODO HISTÓRICO			ANÁLISIS DEL CONTEXTO
	Monarquía romana	República romana	Imperio romano	
Contexto político	Concentración del poder en el monarca	Magistraturas romanas Periodo democrático romano	Poder concentrado en el princeps, estado teocrático imperial burocrático.	Constituye una actividad didáctica compleja que actúa como cierre de la unidad didáctica de fundamentos históricos y epistémicos del Derecho romano. El estudiante logra entender: la lógica relacional entre base económica y superestructura La relación entre indicadores generales aplicables a todos los periodos El Derecho a través de sus fuentes, como resultado normativo de las relaciones políticas, económicas y socioculturales.
Contexto económico	Relaciones de producción esclavista agrarias	Diversificación de actividades económicas	Diversas actividades económicas / crisis económica	
Contexto sociocultural	Clases sociales con diferencias marcadas	Se complejizan las relaciones sociales (Patricios y Plebeyos: pensamiento iusfilosófico) (Diversificación poblacional como resultado de la ampliación de las fronteras y las guerras de conquista)	Clases sociales complejas de naturaleza oriental y gérmen del futuro sistema feudal	
Fuentes del Derecho	Derecho esclavista, poco desarrollado (Costumbre & Lex)	Derecho mucho más complejo y técnico. (Constumbre, Lex, Senadoconsultos, Plebiscitos, Edictos)	Derecho petrificado / compilaciones jurídicas (Costumbre, senadoconsultos, Ley de Citas, constituciones imperiales, Corpus Iuris Civilis)	

Source: Author's own work

Phase 3. Developing a Legal Mindset

Strategic Action: Recall

This process serves as a categorical framework that students use to organize new knowledge. Mentally, students reorganize the information they have obtained or new information based on key points, concepts, and indicators that allow them to classify that knowledge. It constitutes an effective tool for applying historical, political, and social foundations to the specific study of the branches of law recognized by different civilizations.

Strategic Action: Transfer

This is directly related to the student's ability to master the skill in its two aspects: recognizing that they can apply it when faced with a situation similar to one they have learned, and understanding that they can apply it to new scenarios. It constitutes the advanced stage where the student acquires the skill, automates it, and thus generalizes it, which involves strategies across a variety of legal scenarios and contexts to learn how to transfer the skill. In the context of epistemic teaching, the study of legal situations is fundamental to achieving this phase.

This activity integrates all the elements analyzed: motivation, application of concepts, analysis and synthesis, algorithmic logic, legal mindset, and the identification and application of legal norms. The instructor must properly plan and organize the activity, taking into account the objectives to be achieved and the specific area of law.

Through this activity, students are introduced based on epistemological knowledge to a process that will enable them in the future *to litigate with the skill required in judicial proceedings, using a relevant and coherent strategy and presenting logically structured arguments in court* (Galdames Gaytán, 2024).

Example of a Phase III teaching activity:

Resolving Legal Situations

Objective: To resolve legal situations in the various historical periods studied, taking into account the political, socioeconomic, and regulatory context.

Procedure: Based on a presented legal situation, the student resolves several questions using a step-by-step logical framework provided by the instructor. The student must consider the area of law, the legal nature of the issue, the parties involved, the legal rationale, and a possible solution. The following structure is provided as an example:

Table 3: *Logical Steps for Resolving Legal Situations*

SITUACIÓN JURÍDICA	ÁREA DE DERECHO	POSIBLE SOLUCIÓN	ANÁLISIS DEL CONTEXTO
Servio Aurelio de 25 años sirve en el ejército romano en la centuria protectora de una parte de la frontera de la Galia. En un enfrentamiento con los galos es apresado, torturado y muerto. La noticia llega a su familia que decide honrar su última voluntad dejada en testamento. Ante esta situación, su hermano mayor se opone e intenta declarar nulo el testamento para adjudicarse los cuantiosos bienes.	Civil. Derecho de sucesiones	El acto sucesorio es válido y nula cualquier acción que realice el hermano en contra de la voluntad del causante.	El estudiante deberá considerar además de las acciones solicitadas por el docente: el contexto económico y político de Roma con respecto a los soldados y el riesgo de guerra, la existencia de varios ordenamientos en dependencia de su estatus social, las funciones de las magistraturas y la repercusión en la normativa. (Derecho de postliminio y la fictio legis corneliae)
Silio Ulpio, integrante de una familia de comerciantes en Hispania, provincia romana, se niega a participar en las elecciones del pretor urbano en Roma. Ante esto, el ejército romano lo detiene y es acusado de traición y condenado a muerte.	Público	El acto es nulo. El estatus socio político del implicado hace imposible el actuar antijurídico.	

Source: author's own work

The proposed process and its strategy conclude with evaluation. This component allows for an assessment of how closely the process aligns with the proposed objective and the levels of qualitative transformation in the learner. This implies understanding it as a dialogical, democratic, and transformable process that serves as a measure of the entire process's effectiveness, contributing to success and preventing failure.

Conclusions

The theoretical, historical, legal, and pedagogical study conducted demonstrates the progressive and multicausal nature of epistemic content as part of legal studies. Its internal system highlights its role in training today's legal professionals in the mastery of legal institutions, legal reasoning, and the ability to resolve conflicts.

In this sense, its manifestation in the pedagogical process must be conceived in terms of its complex and social nature as a legal tradition and the core of a comprehensive and contextualized education in the content that informs the theoretical-normative phenomenon.

This will only be possible through proper integration with cutting-edge pedagogical theories and the use of technological tools as a means for fostering meaningful and relevant learning in changing work contexts.

The cultural and socio-continental heritage it reflects, together with its importance in the formation of legal knowledge, in and of itself justifies the inclusion of these subjects in the education of the continent's legal professionals.

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Digital Divide and Generative Artificial Intelligence Adoption in Higher Education: Quantitative Evidence from University Students in La Libertad, Ecuador

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Introduction

The expansion of artificial intelligence across higher education has occurred at a speed that universities, students, and educational systems have not experienced with most previous digital technologies. Generative artificial intelligence (GenAI) has moved beyond its initial role as an auxiliary tool for information retrieval and is increasingly embedded in activities such as problem solving, text production, coding, academic consultation, and individualized learning support. This transformation has widened the range of resources available to students, while simultaneously raising questions about the conditions under which these resources can actually be used in meaningful ways. Recent literature has consequently shifted from discussing the mere presence of artificial intelligence in education toward examining its implications for learning practices, academic autonomy, equity, and the development of new digital competencies (Bahroun et al., 2023; Miao & Holmes, 2023; Al-Zahrani, 2024).

Access to these opportunities, however, is far from uniform. The digital divide cannot be reduced to whether a student owns a device or has an internet connection. Contemporary approaches increasingly recognize successive layers of inequality involving access, patterns of use, digital skills, and, ultimately, the benefits individuals can obtain from technology (van Dijk, 2020). This distinction becomes particularly relevant in the context of GenAI. Two students may formally have internet access and still face substantially different conditions for using computationally intensive platforms, working continuously online, verifying generated information, or integrating artificial intelligence into demanding academic tasks. In this sense, the emergence of generative technologies has not displaced earlier forms of digital inequality; rather, it may have added a new layer in which the quality of infrastructure and the capacity for technological appropriation become increasingly consequential. Recent work addressing the AI-related digital divide similarly warns that unequal material and educational conditions may shape who can convert access to artificial intelligence into tangible academic opportunities (Beckman et al., 2025; Matjie et al., 2026).

This issue is especially significant in higher education because the educational value of GenAI does not depend exclusively on whether students use it, but on how they incorporate it into their learning processes. Generative systems may support explanations, provide feedback, assist with the decomposition of complex problems, and facilitate forms of self-directed learning; yet these benefits require more than occasional interaction with a chatbot. Students must be able to

formulate adequate queries, assess the plausibility of generated outputs, contrast information with reliable sources, and determine when AI assistance contributes to or interferes with their own understanding. The connection between artificial intelligence and autonomous learning is therefore neither automatic nor technologically neutral. Evidence on AI-supported educational environments suggests that these tools can strengthen self-directed learning under appropriate conditions, while longstanding research on learner autonomy emphasizes that effective independent learning depends on regulation, judgment, and active engagement rather than on resource availability alone (Knowles, 1975; Zimmerman, 2002; Wang et al., 2024). The instrument developed in the present study reflects this distinction by examining not only access to equipment and connectivity but also digital competencies, use of generative AI, structured prompting, bibliographic verification, and perceived academic outcomes.

The problem acquires particular relevance in contexts where the rapid diffusion of AI intersects with pre-existing socioeconomic and territorial inequalities. Digital inequality in Ecuador predates the COVID-19 pandemic. Previous research involving Ecuadorian university students documented socioeconomic differences in academic Internet use, indicating that access and effective utilization were already uneven before the rapid expansion of digitally mediated education (Torres-Diaz & Duart, 2015). La Libertad a coastal canton in the province of Santa Elena provides a relevant setting in which disparities in connectivity, technological equipment, and household socioeconomic conditions may influence students' ability to participate fully in increasingly digital forms of higher education. The transition from emergency remote education to an academic environment increasingly permeated by generative AI makes this context particularly informative: deficiencies that once constrained participation in virtual classes may now also restrict access to more sophisticated forms of AI-mediated learning.

Despite the growing literature on artificial intelligence in higher education, an important analytical gap remains. Much of the discussion has addressed either the educational opportunities and risks associated with GenAI or the broader problem of digital inequality.

Considerably less attention has been devoted to the point at which these two processes intersect: whether differences in technological infrastructure and digital conditions are associated with different levels of GenAI appropriation among university students. This distinction matters because increased connectivity at the population level does not necessarily imply that students have reached equivalent conditions for advanced technology use. Empirical evidence specifically connecting digital inequality with GenAI appropriation in La Libertad remains limited, leaving an important territorial gap in the current literature.

Against this background, the present study examines the relationship between the digital divide and the adoption of generative artificial intelligence among university students residing in La Libertad, Ecuador. Rather than treating digital inclusion as a binary condition, the analysis considers differences in technological equipment, connectivity, digital competencies, and levels of AI use. The study combines retrospective information from official secondary sources covering the 2020–2024 period with evidence obtained from a structured questionnaire administered to university students. Its central purpose is to determine whether the material and technological conditions available to students are associated with their capacity to move from basic access toward more advanced forms of AI-supported autonomous learning. By connecting digital inequality with technological appropriation, the study seeks to contribute empirical evidence from a Latin American setting that remains underrepresented in the rapidly expanding international discussion on GenAI in higher education. The broader argument is that digital inclusion in the age of artificial intelligence should no longer be evaluated solely in terms of

connectivity: what increasingly matters is whether students possess the resources and competencies required to transform technological access into meaningful educational use.

Digital Divide: From Technological Access to Digital Appropriation

The notion of the digital divide has undergone a substantial conceptual transformation. Early approaches tended to frame digital inequality as a relatively straightforward distinction between those who had access to information and communication technologies and those who did not. Although access remains consequential, particularly in territories where connectivity and equipment are unevenly distributed, this binary interpretation has become increasingly inadequate. Digital inequality is better understood as a cumulative process in which material access, skills, patterns of use, and the outcomes derived from technology interact rather than operate independently (van Dijk, 2020).

This distinction is especially relevant in higher education. Having an internet connection or owning a smartphone does not necessarily imply that a student possesses the technological conditions required for sustained academic participation. Connection stability, bandwidth, the availability of an individual computer, interruptions in electricity or network services, and the possibility of accessing digital resources without competing household demands may produce substantially different learning environments among students who would otherwise be classified simply as "connected". The present study addresses this distinction through variables related to exclusive computer ownership, fixed internet connectivity, service interruptions, digital competencies, and academic uses of technology.

A multidimensional interpretation therefore differentiates at least three intertwined forms of inequality. The first concerns access, understood as the availability and quality of devices and connectivity. The second refers to use and digital competence: what individuals are capable of doing with the technologies available to them, how frequently they use them, and for which purposes. A third layer concerns outcomes or appropriation, namely, the extent to which digital resources can be converted into educational, professional, or socioeconomic advantages. These levels should not be treated as entirely separate stages. Deficiencies in one can constrain advancement in another, while accumulated advantages may allow technologically better-positioned students to extract greater value from new digital resources.

Generative artificial intelligence complicates this landscape. Unlike many conventional digital services, access to GenAI does not by itself determine the educational value students can obtain from it. Meaningful use requires an additional repertoire of capabilities: identifying suitable problems for AI assistance, formulating prompts, iterating queries, judging the quality of outputs, identifying possible errors, and contrasting generated information against reliable academic sources. Consequently, a student may have overcome a first-level digital divide while remaining disadvantaged at the level of effective appropriation. In this sense, the diffusion of GenAI does not simply replace older forms of technological inequality; it can expose their persistence under a different configuration.

Recent discussions of the AI-related digital divide reinforce this concern. Unequal access to infrastructure, digital competencies, and institutional support may determine not only who can use emerging AI systems but also who is able to turn them into meaningful educational resources (Beckman et al., 2025; Matjie et al., 2026). This is particularly important in contexts characterized by socioeconomic and territorial asymmetries. Within Ecuador, this problem is particularly relevant in coastal and semi-urban environments where differences in household resources and

technological conditions may continue to shape students' opportunities for advanced digital participation.

Thus, the central concern is no longer exclusively whether technology is available. A more consequential question is what students are able to accomplish with the technology to which they ostensibly have access. Under this interpretation, generative AI becomes a useful setting for examining contemporary digital inequality because it exposes the distance between connectivity, competent use, and educational appropriation.

Technology Adoption and the UTAUT Perspective

Access to technology alone cannot explain its adoption. Students may operate within similar technological environments while exhibiting markedly different patterns of acceptance, frequency of use, and integration into academic routines. Technology-adoption frameworks are therefore useful for examining the transition between the availability of a digital resource and its effective incorporation into everyday practice.

The Unified Theory of Acceptance and Use of Technology (UTAUT) provides one of the most established frameworks for approaching this problem. Developed by Venkatesh et al. (2003), UTAUT integrates earlier models of technology acceptance around four central determinants: performance expectancy, effort expectancy, social influence, and facilitating conditions. In its original formulation, these constructs help explain users' behavioral intentions and actual technology use.

The framework acquires particular relevance in the case of generative AI. Performance expectancy concerns the degree to which students believe that using AI can improve academic performance, productivity, comprehension, or task completion. Effort expectancy reflects the perceived ease associated with interacting with AI-based tools. Social influence encompasses the role played by peers, instructors, institutional expectations, and the wider academic environment in normalizing or discouraging AI use. Facilitating conditions, in turn, refer to the technical and organizational resources that make adoption feasible.

It is this final dimension that is especially important for the present study. Generative AI may be perceived as useful and relatively easy to operate, yet those perceptions do not remove material constraints. Reliable internet access, adequate hardware, prior digital competence, and uninterrupted connectivity can determine whether favorable intentions are translated into sustained and more sophisticated forms of use. These facilitating conditions therefore constitute a central link between the digital divide and AI adoption, particularly for students from households with fewer technological resources. This interpretation is consistent with evidence from higher education showing that facilitating conditions play a particularly relevant role in students' acceptance and use of ChatGPT (Habibi et al., 2023).

Recent empirical evidence suggests that UTAUT-based approaches remain relevant for studying GenAI adoption among university students. Zhao et al. examined 500 university students from Malaysia and China using an extended UTAUT2 framework and found that the factors associated with GenAI adoption were not identical across the two national contexts, underscoring the importance of contextual conditions in explaining adoption behavior (Zhao et al., 2025). This point is particularly valuable for the present research: adoption models developed or tested in technologically advantaged settings should not be assumed to operate identically in territories where connectivity, household resources, and digital competencies remain uneven.

At the same time, this study does not treat UTAUT as an exhaustive explanation of students' relationship with artificial intelligence. Its use is more specific. The framework provides a bridge between technological conditions and adoption behavior, while the multidimensional digital-divide perspective explains why those facilitating conditions may themselves be distributed unequally. Read together, the two perspectives allow a more nuanced interpretation: differences in GenAI adoption may arise not only from individual willingness or perceived usefulness but also from disparities in the material and cognitive resources required to use the technology effectively.

This distinction prevents a common analytical simplification. Low or superficial use of AI should not automatically be interpreted as reluctance to innovate. Under unequal technological conditions, what appears as limited adoption may partly reflect restrictions in connectivity, hardware availability, or previously accumulated digital competence. Conversely, students with more favorable technological environments may have greater opportunities to experiment repeatedly with AI, refine their interaction strategies, and eventually incorporate the technology into more demanding academic activities.

Generative AI and Autonomous Learning in Higher Education

The educational relevance of generative AI extends beyond technology adoption. Once incorporated into academic routines, AI-based tools can intervene in how students search for information, interpret unfamiliar concepts, structure solutions, obtain feedback, and manage the time required to complete learning activities. These functions bring GenAI into direct contact with a longstanding concern in higher education: autonomous and self-directed learning.

Autonomous learning does not imply studying in isolation. Rather, it concerns the learner's capacity to exercise meaningful control over the learning process identifying needs, selecting resources, regulating effort, monitoring progress, and evaluating whether an acquired answer or strategy is adequate. Classical accounts of self-directed and self-regulated learning therefore emphasize agency, metacognition, monitoring, and judgment rather than the simple availability of educational resources (Knowles, 1975; Zimmerman, 2002). The emergence of GenAI introduces an unusual resource into this process because the tool does not merely provide stored information; it can generate explanations, reformulate content, answer follow-up questions, propose solutions, and respond dynamically to user input.

Such affordances may support autonomous learning. AI-mediated environments can reduce the time required to obtain explanations, provide immediate assistance outside formal teaching hours, and allow students to explore problems iteratively. Contemporary literature has accordingly identified opportunities for AI-powered educational systems to support self-directed learning and individualized academic assistance (Wang et al., 2024). In this study, generative tools are conceptualized as increasingly embedded within university learning activities rather than functioning only as supplementary information sources.

Yet the capacity to obtain an answer from a generative system should not be equated with autonomous learning. This distinction is essential. A learner who delegates a task without evaluating the generated output may complete an activity more rapidly while gaining little conceptual understanding. By contrast, a student who reformulates prompts, compares alternative responses, identifies weaknesses, and verifies claims against academic sources is engaging in a markedly different form of AI-mediated learning. The educational outcome therefore depends not simply on frequency of use but on the quality of interaction and the cognitive practices surrounding that use.

The questionnaire underlying the present study captures several elements of this distinction. Alongside frequency of GenAI use, it includes items concerning structured prompt formulation, use of AI for more complex tasks, and bibliographic verification of generated responses. This makes it possible to approach AI adoption as more than a yes/no behavior. From a digital-appropriation perspective, advanced adoption implies that students have begun to integrate the technology into their learning strategies while retaining some degree of evaluation and academic judgment.

This relationship is nevertheless conditioned by unequal technological circumstances. Students who experience recurrent connectivity failures or who depend on limited devices may have fewer opportunities to interact iteratively with AI systems, explore alternative prompts, compare outputs, or combine several academic resources during the same task. Those with stable broadband connections and exclusive access to a computer may encounter fewer such constraints. The difference is subtle but consequential: inequality may affect not only whether students use AI but also how deeply they are able to incorporate it into autonomous learning practices.

From this perspective, generative AI sits at the intersection of three processes that have often been investigated separately: digital inequality, technological adoption, and learner autonomy. The present study brings these processes together. The digital-divide perspective explains unequal access to resources and competencies; UTAUT helps interpret the conditions that enable or inhibit adoption; and autonomous-learning theory provides a basis for examining the educational meaning of that adoption. The resulting conceptual framework therefore moves beyond a binary question of AI access and focuses instead on whether students possess the material and cognitive conditions needed to convert AI availability into meaningful academic use.

The relationship proposed by the study can be summarized as follows:

Digital conditions → facilitating conditions and digital competencies → level of GenAI adoption → possibilities for AI-mediated autonomous learning.

This sequence should not be interpreted as a deterministic causal chain. The current design is primarily correlational and therefore cannot establish that technological infrastructure alone causes differences in learning outcomes. Rather, the framework identifies a theoretically plausible set of relationships that can be examined empirically: students' socioeconomic and technological circumstances may be associated with differences in access and digital competence, while these conditions may, in turn, be associated with more or less advanced forms of GenAI adoption.

This qualification is essential because the correlational design does not support causal interpretation of the proposed relationships.

Statistical analyses were conducted using IBM SPSS Statistics.

The analytical process began with descriptive statistics. Frequencies and percentages were calculated for categorical variables, while means and standard deviations were used to summarize Likert-type questionnaire responses. For the secondary-data component, temporal comparisons were made across the 2020–2024 period to identify changes in indicators related to connectivity and technological access.

Subsequently, Spearman's rank-order correlation coefficient (**ρ**) was employed to assess the direction and magnitude of the relationships among socioeconomic conditions, technological equipment and network conditions, and GenAI adoption. This non-parametric approach was selected because several of the variables were ordinal or derived from Likert-type responses. The significance level was established at $p<0.05$.

A binary logistic regression model was employed to examine whether technological and socioeconomic conditions were associated with the probability of advanced GenAI adoption. The modeled event was coded as Adoption_IA = 1 and represented advanced use characterized by complex prompt formulation and verification or comparison of generated responses.

The explanatory variables included fixed fiber-optic internet access, exclusive computer availability, socioeconomic level, and prior digital competence.

The model can be expressed conceptually as:

$$\ln[P(\text{Adoption_IA} = 1) / (1 - P(\text{Adoption_IA} = 1))] = \beta_0 + \beta_1\text{Internet} + \beta_2\text{Computer} + \beta_3\text{Socioeconomic Level} + \beta_4\text{Digital Competence}$$

Results were interpreted through regression coefficients, odds ratios (OR), and corresponding significance levels. The original analysis reported, among its principal estimates, an odds ratio of approximately 3.42 for fixed fiber-optic internet access and 2.68 for exclusive computer ownership, indicating substantially greater odds of meeting the advanced GenAI adoption criterion.

Because the original individual-level dataset is no longer available, no additional diagnostic statistics or alternative model specifications could be generated retrospectively. The reported econometric results therefore correspond exclusively to the analyses performed on the original field data.

Ethical Considerations

Participation in the study was voluntary and anonymous. Before completing the questionnaire, respondents were informed of the academic purpose of the research and were invited to participate voluntarily. No names, identification numbers, email addresses, or other personally identifiable information were collected.

Participants were free to discontinue the questionnaire before submitting their responses, and the information provided was used exclusively for research purposes. Data were analyzed and reported in aggregate form, preventing individual respondents from being identified from the findings.

No formal institutional ethics approval was documented for this study. The ethical safeguards implemented included voluntary participation, prior information about the purpose of the research, anonymous data collection, the absence of personally identifiable information, and aggregate reporting of results.

Characteristics of the Study Sample

The final analytical sample comprised 378 university students residing in La Libertad. Slightly more than half of the participants were located in urban sectors (53.4%), while 42.6% lived in urban-marginal areas and 4.0% in the industrial sector. With respect to academic progression,

the sample was concentrated in the later stages of university education: 53.4% were enrolled in the seventh or eighth semester or had recently completed their studies, whereas 44.7% were in the fifth or sixth semester. Only 1.9% belonged to the first four semesters.

Table 1. *Sociodemographic characteristics of the sample (n = 378)*

Variable / Category	n	%
Area of residence		
Urban sector	202	53.4
Urban-marginal sector	161	42.6
Industrial sector	15	4.0
Academic level		
7th–8th semester / recent graduate	202	53.4
5th–6th semester	169	44.7
1st–4th semester	7	1.9

The composition of the sample therefore captured substantial representation from both urban and urban-marginal environments, a feature that is particularly relevant to the study because access conditions and technological resources were expected to vary across residential contexts.

Evolution of Digital Access, 2020–2024

Official ICT statistics indicate that digital access expanded in Ecuador during the analyzed period, although the trajectory differed across indicators. The proportion of households with internet access increased from 53.2% in 2020 to 60.4% in 2022 and 66.0% in 2024. Internet use among the population aged five years and older also increased overall, from 70.7% to 77.2%, despite a slight decline in 2022. At the same time, digital illiteracy among people aged 15–49 years decreased from 10.2% in 2020 to 5.4% in 2024.

A different pattern was observed for household technological equipment. The proportion of households reporting access to a desktop computer, laptop, or tablet declined from 43.9% in 2020 to 40.4% in 2022 and 33.2% in 2024. This divergence indicates that improvements in connectivity did not occur in parallel with an expansion of conventional computing equipment, reinforcing the need to distinguish between internet availability and the material resources through which digital activities are performed.

Table 2. *Evolution of selected ICT indicators in Ecuador, 2020–2024*

Indicator	2020 (%)	2022 (%)	2024 (%)	Absolute change 2020–2024 (p.p.)
Households with internet access	53.2	60.4	66.0	+12.8
Households with desktop computer, laptop, or tablet	43.9	40.4	33.2	−10.7
Persons aged ≥5 years using the internet	70.7	69.7	77.2	+6.5
Digital illiteracy among persons aged 15–49 years	10.2	8.2	5.4	−4.8

Source: Authors' compilation based on official INEC ICT statistics. Data for 2020 derive from the Multipurpose Household Survey, while data for 2022 and 2024 derive from ENEMDU.

The contrast between connectivity and equipment is noteworthy. By 2024, approximately two-thirds of households had internet access, whereas only one-third reported having a desktop computer, laptop, or tablet. The contrast suggests that connectivity expanded more rapidly than access to conventional computing equipment, highlighting the multidimensional nature of digital inclusion.

Technological Infrastructure and Connectivity Conditions

The primary survey provides a more detailed view of students' immediate technological environment. For exclusive computer availability, 59.8% of respondents selected the two highest response categories, yielding a mean score of 3.64 (SD = 1.13). Fixed fiber-optic connectivity obtained a lower mean of 3.27 (SD=1.27), with 37.3% of students reporting the two highest response levels.

Connectivity quality remained uneven. Half of the respondents selected one of the two highest response categories for service interruptions associated with network failures, power outages, or related disruptions. The mean score for this item was 3.62 (SD=1.00), showing that connectivity problems remained a recurrent feature of the educational environment despite the broader expansion of internet access.

Table 3. *Technological infrastructure and network conditions (n = 378)*

Item	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	Mean	SD
Exclusive access to an adequate computer	6.1	8.7	25.4	34.4	25.4	3.64	1.13
Fixed fiber-optic connection	10.6	14.0	38.1	12.2	25.1	3.27	1.27
Interruptions due to outages/failures	2.4	7.1	40.5	26.5	23.5	3.62	1.00

These results distinguish availability from stability. A student may formally have access to digital infrastructure while still experiencing interruptions substantial enough to interfere with continuous academic use.

Digital Competencies and Generative AI Adoption

Students generally reported favorable levels of basic digital competence. Scientific information-search skills produced the highest mean within this group, at 3.75 (SD=0.94), whereas daily use of the Moodle platform registered a more moderate mean of 3.35 (SD=1.15).

Generative AI use displayed a different pattern. For the item measuring the use of GenAI in academic learning activities, 40.7% of respondents selected either "frequently" or "always," with a mean score of 3.52 (SD=1.00). The application of AI to more complex models or coding tasks produced a slightly lower average (M=3.42, SD=1.08).

Structured prompt formulation reached a mean of 3.43 (SD=1.10), while verification of AI-generated responses against bibliographic sources yielded one of the highest GenAI-related means, 3.53 (SD=1.05). Approximately 42.0% of respondents reported frequent or consistent bibliographic verification.

Table 4. *Digital competencies and generative AI adoption (n = 378)*

Item	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	Mean	SD
Scientific information-search skills	1.9	5.6	31.7	37.0	23.8	3.75	0.94
Daily use of Moodle	5.3	14.8	43.4	12.2	24.3	3.35	1.15
GenAI use in academic activities	2.6	6.3	50.3	17.7	23.0	3.52	1.00
AI use in complex models/coding	3.7	11.9	45.5	16.1	22.8	3.42	1.08
Structured prompt formulation	4.0	12.2	44.4	15.6	23.8	3.43	1.10
Bibliographic verification of AI outputs	2.9	8.7	46.3	16.9	25.1	3.53	1.05

The distribution is particularly revealing because AI adoption was not concentrated exclusively at either extreme. Across the four GenAI indicators, a substantial share of respondents remained in the midpoint of the scale, suggesting considerable heterogeneity in the transition from occasional use toward more structured forms of technological appropriation.

Perceived Academic Outcomes

Students reported the strongest perceived effect of GenAI in relation to time efficiency. Nearly two-thirds of the respondents (64.0%) selected one of the two highest categories when asked whether AI enabled them to complete academic activities more quickly. This item recorded the highest mean in the survey, 3.79 (SD=0.96).

Perceived improvement in conceptual understanding was considerably less pronounced. Only 38.6% selected the two highest categories for this item, which produced a mean of 3.31 (SD=1.23). This divergence indicates that respondents associated GenAI more strongly with efficiency than with deeper comprehension.

Finally, 47.8% of students agreed or strongly agreed that differences in connectivity and AI access were reflected in academic disparities, yielding a mean score of 3.60 (SD=1.00).

Table 5. *Perceived academic outcomes and digital inequality (n = 378)*

Item	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	Mean	SD
Time optimization in academic tasks	2.9	4.2	28.8	39.4	24.6	3.79	0.96
Improved understanding of academic content	10.3	10.6	40.5	15.1	23.5	3.31	1.23
Perceived academic gap associated with connectivity/AI	2.9	5.3	43.9	24.3	23.5	3.60	1.00

This distinction between efficiency and understanding will be important in the Discussion section. For the Results section, however, it is sufficient to note that the strongest perceived benefit concerned the speed with which academic activities could be completed rather than conceptual learning itself.

Associations among Socioeconomic Conditions, Technological Resources, and AI Adoption

Spearman's rank-order correlations showed positive associations among the three variables retained in the correlation matrix.

The strongest relationship was observed between socioeconomic level and technological equipment/network conditions (**ρ**=0.624). Technological equipment and network conditions were also positively related to GenAI adoption (**ρ**=0.573), while socioeconomic level showed a moderate association with AI adoption (**ρ**=0.485).

Table 6. Spearman correlation matrix (n = 378)

Variable	1	2	3
1. Socioeconomic level	1.000	0.624	0.485
2. Technological equipment and network conditions	0.624	1.000	0.573
3. Generative AI adoption	0.485	0.573	1.000

Note. All reported correlations were statistically significant at $p < 0.01$. The association between technological equipment/network conditions and GenAI adoption was $p < 0.001$.

Source: Authors' analysis based on primary survey data (n = 378).

Binary Logistic Regression of Advanced GenAI Adoption

A binary logistic regression model was used to examine whether technological and socioeconomic conditions were associated with the probability of advanced GenAI adoption. The modeled event (Adoption_IA = 1) represented students whose use was characterized by complex prompt formulation and verification or comparison of AI-generated responses.

Students with fixed fiber-optic internet access had 3.421 times the odds of meeting the advanced-adoption criterion compared with students without this condition, holding the remaining predictors constant.

Exclusive access to a laptop or desktop computer was associated with 2.678 times the odds of meeting the advanced-adoption criterion.

All four covariates showed statistically significant positive coefficients. Fixed fiber-optic internet access was associated with greater odds of meeting the advanced-adoption criterion (**β** = 1.230, $p < 0.001$, OR = 3.421). Exclusive laptop or desktop availability showed a similar positive association (**β** = 0.985, $p < 0.001$, OR = 2.678). The residential-sector socioeconomic proxy (**β** = 0.412, $p = 0.008$, OR = 1.510) and prior digital competence (**β** = 0.654, $p < 0.001$, OR = 1.923) were also positively associated with the modeled outcome.

Table 7. Binary logistic regression of advanced GenAI adoption

Predictor	**β**	SE	p	OR	95% CI for OR
Fixed fiber-optic internet access	1.230	0.285	<0.001	3.421	**1.957–5.981**
Exclusive laptop/PC	0.985	0.262	<0.001	2.678	**1.602–4.475**
Residential-sector socioeconomic proxy	0.412	0.154	0.008	1.510	**1.116–2.042**

Predictor	β	SE	p	OR	95% CI for OR
Prior digital competence	0.654	0.182	<0.001	1.923	**1.346–2.748**
Constant	−2.840	0.450	<0.001	0.058	

Note. OR = odds ratio; CI = confidence interval. The 95% confidence intervals for the odds ratios were calculated as exp(**β** ± 1.96 × SE).

Taken together, the regression estimates indicate that technological conditions were associated with substantial differences in the odds of meeting the advanced GenAI-adoption criterion. Fixed fiber-optic internet access and exclusive computer availability displayed the largest odds ratios among the predictors included in the model.

The findings reveal a pattern that is increasingly relevant to contemporary discussions of digital inequality in higher education: greater connectivity does not necessarily translate into equivalent conditions for meaningful technological participation. At the national level, official ICT indicators show that household internet access expanded between 2020 and 2024, while the proportion of households with a desktop computer, laptop, or tablet declined. The student survey complements this broader context by showing that, in La Libertad, computer availability and connectivity stability remained uneven in April 2026. Taken together, these findings illustrate why improvements in connectivity should not be interpreted as equivalent improvements across all dimensions of digital access.

This asymmetry is important because it challenges a binary understanding of the digital divide. The apparent narrowing of the connectivity gap may coexist with persistent differences in the quality, stability, and educational usability of technological access. From the perspective proposed by van Dijk (2020), the results are consistent with the idea that digital inequality operates across successive and overlapping dimensions rather than disappearing once basic connectivity is achieved. The issue therefore shifts from whether students are connected to whether they possess the resources and competencies required to transform that connection into academically productive forms of participation. The conceptual distinction between access, use, and appropriation is particularly useful here because national improvements in connectivity coexist with substantial heterogeneity in the technological conditions reported by students in La Libertad.

Digital Infrastructure as a Condition for GenAI Adoption

One of the most consistent findings concerns the relationship between technological infrastructure and generative AI adoption. The correlation between equipment/network conditions and GenAI adoption was moderately strong and positive (**ρ** = 0.573), while the regression analysis indicated substantially greater odds of meeting the advanced GenAI-adoption criterion among students with fixed fiber-optic internet access and exclusive computer availability.

These findings suggest that the emerging AI divide cannot be understood exclusively in terms of willingness to use artificial intelligence. Material conditions continue to matter. Generative systems may be technically accessible through smartphones, yet sustained academic use often involves longer interactions, simultaneous consultation of documents, iterative prompting, bibliographic verification, file handling, coding, or comparison among multiple information

sources. Such activities are considerably easier to conduct under conditions of stable broadband access and dedicated computing resources.

This interpretation is consistent with recent discussions emphasizing that the diffusion of AI can reproduce pre-existing digital inequalities rather than automatically overcoming them. Recent evidence suggests that the expansion of GenAI can reproduce disparities in access, literacy, and opportunities for meaningful academic use. Beckman et al. (2025) identify an emerging GenAI divide among university students, while Matjie et al. (2026) similarly emphasize that unequal technological and educational conditions can restrict equitable participation in AI-mediated learning.

The evidence from La Libertad adds a territorial dimension to this debate. Against a national context of expanding connectivity, the La Libertad survey reveals that technological resources and service stability remain unevenly distributed among university students.. The digital divide is therefore not necessarily disappearing; it may instead be migrating toward differences in quality of access and technological appropriation.

Facilitating Conditions and the UTAUT Perspective

The results also provide support for interpreting GenAI adoption through the facilitating-conditions component of UTAUT. Within this framework, positive attitudes toward technology are not sufficient if users lack the infrastructure and resources required to translate intention into sustained use. Technological conditions consequently emerge as an important component of the adoption process.

The regression results reinforce this interpretation. Fixed fiber-optic internet access showed the largest odds ratio among the variables included in the model, followed by exclusive access to a computer and prior digital competence. Socioeconomic level was also positively associated with the odds of meeting the advanced-adoption criterion.

Taken together, these associations suggest that facilitating conditions should not be treated merely as a peripheral factor in GenAI adoption. In contexts characterized by unequal infrastructure, they may become one of the principal mechanisms through which socioeconomic differences are translated into technological differences. This pattern is consistent with Habibi et al. (2023), whose analysis of ChatGPT acceptance in higher education also highlighted the importance of facilitating conditions in shaping technology adoption.

This point has theoretical implications. Technology-adoption models are frequently centered on individual perceptions usefulness, ease of use, behavioral intention, or social influence. In the present context, however, the structural environment surrounding the student appears equally consequential. A learner may recognize the academic value of GenAI and still be unable to use it intensively because of unstable connectivity, insufficient hardware, or limited prior experience with digital academic resources.

For this reason, the relationship between UTAUT and the multidimensional digital-divide framework is particularly productive. UTAUT helps explain why technological and organizational conditions matter for adoption, whereas the digital-divide literature helps explain why those conditions are not distributed equally across the student population.

From AI Use to AI Appropriation

Another relevant feature of the findings is the distinction between simply using GenAI and engaging with it through more advanced practices.

Approximately four out of ten students reported frequent or continuous use of generative AI for academic activities, while similar proportions reported structured prompting and bibliographic verification. The mean scores for GenAI use, structured prompts, complex applications, and verification were relatively close, suggesting that adoption in the sample was neither uniformly superficial nor uniformly advanced.

This intermediate pattern is analytically important. It suggests that the relevant educational divide may increasingly involve differences in how AI is used rather than simply whether it is used.

A student who occasionally asks a chatbot for an answer and a student who iteratively constructs prompts, compares responses, checks sources, and incorporates AI into complex academic activities would both technically be classified as AI users. Their degree of technological appropriation, however, is clearly different.

This distinction aligns with the broader conceptual shift proposed in the study. Digital inclusion in the GenAI era should not be evaluated solely through access indicators. It should also consider the capacity to engage critically and strategically with algorithmic systems.

The bibliographic-verification result is especially notable. Approximately 42% of respondents reported frequent or consistent verification of AI-generated content. This does not demonstrate that students systematically possess advanced AI literacy, but it indicates that a meaningful segment of the sample has begun to incorporate evaluative practices into its interaction with generative systems.

That behavior is particularly relevant given the concerns raised in the literature about hallucinations, inaccuracies, academic integrity, and overreliance on generative systems. This interpretation is consistent with studies addressing both the opportunities and risks of GenAI in educational settings, including Bahroun et al. (2023), Al-Zahrani (2024), Cotton et al. (2024), and Hwang and Chang (2023).

Efficiency Does Not Necessarily Mean Deeper Learning

Perhaps one of the most revealing results emerges from the contrast between perceived efficiency and perceived conceptual understanding.

The highest-scoring perceived outcome concerned the ability to complete academic activities in less time. Approximately 64% of respondents reported a favorable perception in this regard. By contrast, only 38.6% reported that GenAI substantially improved their understanding of academic content.

This difference deserves careful interpretation.

Generative AI appears to be perceived first and foremost as a mechanism for reducing the effort or time required to complete certain academic tasks. Such efficiency can be educationally valuable, particularly when AI assists students in locating information, reformulating explanations, or overcoming procedural barriers. Yet faster task completion does not necessarily imply deeper cognitive engagement.

The distinction is consistent with established theories of autonomous and self-regulated learning. Learner autonomy involves monitoring, evaluation, decision-making, and active control over the learning process rather than the mere ability to obtain an answer quickly. Knowles (1975) and Zimmerman (2002) emphasize the learner's active role in managing and evaluating learning.

GenAI therefore presents a dual possibility. It can function as a cognitive support that facilitates exploration and independent learning, or it can become a shortcut that reduces the amount of cognitive processing required to complete a task. The data available in this study cannot determine which mechanism predominates, but the divergence between time optimization and conceptual understanding indicates that these outcomes should not be treated as interchangeable.

This finding also introduces an important educational implication: universities should avoid evaluating the success of AI integration solely through adoption rates. High frequency of use may coexist with modest improvements in understanding. The relevant question is not simply whether students use generative AI, but whether they develop practices that strengthen interpretation, verification, and independent reasoning.

Socioeconomic Inequality and the Emergence of an AI Appropriation Gap

The association between socioeconomic level and technological conditions provides another layer of interpretation. The strongest correlation in the matrix was observed between socioeconomic level and equipment/network conditions (ρ=0.624). Socioeconomic level was also positively related to GenAI adoption (ρ=0.485).

These relationships indicate that residential socioeconomic context, technological conditions, and GenAI adoption were statistically intertwined within the sample. The observed associations are compatible with a cumulative pattern in which territorial socioeconomic differences coexist with unequal technological resources and different opportunities for more advanced GenAI use. This pattern should not be interpreted as a causal sequence, because the cross-sectional design does not establish temporal ordering among these dimensions.

This should not be interpreted as a causal sequence established by the present study. The cross-sectional component cannot prove that one factor produces the next. Nevertheless, the observed pattern is consistent with the multidimensional digital-divide perspective, in which early inequalities in material access can influence subsequent differences in skills, use, and outcomes.

The territorial context makes this particularly relevant. Urban-marginal sectors of La Libertad constitute particularly relevant environments because technological access and socioeconomic constraints may overlap. Given that 42.6% of the survey participants came from urban-marginal areas, these conditions are not peripheral to the sample but form a substantial part of the empirical setting.

The implication is broader than the Ecuadorian case. As generative AI becomes increasingly normalized in higher education, inequalities in hardware, connectivity, and digital competence may begin to influence students' ability to benefit from AI-enhanced learning environments. In this sense, the digital divide may be entering a new stage characterized less by complete technological exclusion and more by unequal capacity to appropriate increasingly sophisticated tools.

Implications for Higher Education Policy and Practice

The results suggest that institutional responses should move beyond conventional connectivity policies. Expanding internet availability remains necessary, but it may no longer be sufficient for meaningful digital inclusion.

A more comprehensive institutional strategy would need to address at least three interconnected areas: reliable technological infrastructure, access to adequate computing devices, and the development of advanced digital and AI-related competencies.

The first two respond to the material dimension identified in the regression results. The third concerns the quality of technological appropriation. Students require more than operational familiarity with GenAI interfaces; they need to learn how to formulate productive queries, recognize limitations in generated content, verify claims, manage sources, and decide when AI assistance is pedagogically appropriate.

This is where the distinction between digital literacy and AI literacy becomes increasingly relevant (Ng et al., 2021). Institutional training should therefore not be restricted to "prompt engineering" understood as a collection of technical tricks. A stronger educational approach would combine prompting skills with source verification, critical interpretation, ethical use, transparency, and awareness of algorithmic limitations.

For UPSE and similar universities operating in contexts of uneven digital access, targeted support may be particularly important for students whose household infrastructure places them at a disadvantage. Public connectivity spaces, extended computer-laboratory access, device-support initiatives, and structured AI-literacy programs could help reduce the likelihood that the expansion of GenAI reinforces existing technological inequalities.

Conclusions and Implications

This study examined the relationship between digital inequality and generative artificial intelligence adoption among university students in La Libertad, Ecuador, combining national ICT trends with cross-sectional survey evidence. Official indicators show that household internet access expanded in Ecuador between 2020 and 2024, while access to conventional computing equipment declined. The April 2026 student survey, in turn, revealed heterogeneous technological conditions in La Libertad, particularly regarding exclusive computer availability and service stability.

The empirical findings further show that these differences are associated with the way students engage with generative AI. Technological equipment and network conditions displayed a positive relationship with GenAI adoption, while the binary logistic regression showed the largest odds ratios for fixed fiber-optic internet access and exclusive computer availability in relation to the advanced-adoption criterion. These results suggest that access to generative AI should not be interpreted as an isolated behavioral choice. The capacity to incorporate these tools into academic practice remains partly embedded in the material and socioeconomic environment surrounding the student. An equally important finding concerns the nature of the benefits students associate with AI. Respondents perceived its contribution to time efficiency more strongly than its contribution to conceptual understanding. This distinction cautions against treating frequency of use as evidence of educational effectiveness. The presence of AI in students' academic routines does not, by itself, demonstrate deeper learning, stronger critical reasoning, or greater autonomy.

From a theoretical standpoint, the study supports an interpretation of digital inequality that extends beyond connectivity. In the context of generative AI, the relevant divide increasingly involves the capacity to convert technological availability into purposeful and critically mediated academic use. The results therefore connect three dimensions that are frequently considered separately: digital access, technology adoption, and autonomous learning. Under this framework, digital inclusion is better understood as a continuum that moves from infrastructure toward competence and, ultimately, meaningful technological appropriation.

The findings also carry practical implications for higher education institutions. Policies centered exclusively on internet expansion may be insufficient in environments where students continue to differ in device availability, service stability, and digital competence. Universities should therefore complement infrastructure initiatives with programs that strengthen AI literacy, critical source verification, responsible prompting practices, and informed decision-making about when and how generative systems should be used. Support mechanisms may be particularly relevant for students whose socioeconomic circumstances restrict access to reliable devices or connectivity. At the institutional level, this implies that AI integration should not be evaluated solely through adoption rates. A more meaningful assessment would consider whether students are able to use generative tools critically, independently, and in ways that contribute to learning rather than merely accelerating task completion. From this perspective, the challenge facing universities is not simply to facilitate access to AI, but to prevent a new form of inequality in which some students move toward advanced technological appropriation while others remain confined to intermittent or superficial use.

Future research should extend this analysis across multiple universities and regions, incorporate longitudinal designs capable of tracking changes in AI use over time, and employ validated measurement instruments that distinguish between frequency of use, depth of appropriation, AI literacy, and measurable academic outcomes. The inclusion of objective indicators of learning performance would also help determine whether the perceived efficiency gains associated with GenAI are accompanied by improvements in understanding, retention, or academic achievement. Overall, the evidence from La Libertad suggests that the emergence of generative artificial intelligence has not rendered the traditional digital-divide debate obsolete. Instead, it has made that debate more complex. As access becomes increasingly widespread, inequalities are shifting toward the quality of connectivity, the availability of adequate devices, accumulated digital competence, and the ability to transform AI access into meaningful educational opportunities.

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The Strategic Role of Universities in Entrepreneurship Management and Local Development in Ecuador

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Introduction

In recent decades, entrepreneurship has been recognized as one of the main drivers of economic and social development, particularly in low- and middle-income countries. This phenomenon has gained greater relevance in contexts characterized by high levels of unemployment, informality, and job insecurity, where entrepreneurship becomes a strategy for subsistence, productive inclusion, and income generation (Martínez, 2021). In the case of Latin America, and particularly in Ecuador, the post-pandemic economic crisis and market fluctuations have exacerbated the need to promote initiatives that not only generate self-employment but also have the potential for scalability, innovation, and positive regional impact (Williams & Nadin, 2020). In economies with fragile labor markets, entrepreneurship is not merely an individual choice but a systemic response to the shortage of formal employment and the concentration of opportunities in low-productivity sectors.

From a global perspective, the university is no longer viewed solely as an institution dedicated to training professionals and producing theoretical knowledge, but has positioned itself as a key actor in the processes of innovation, technology transfer, and social transformation (Etzkowitz and Zhou, 2017). In this regard, Clark (2018) argues that "the contemporary university must assume an active role in economic and social development, moving beyond its traditional function of teaching and research." This conceptual evolution gives rise to what the literature refers to as the university's "third mission," which complements teaching and research with an explicit commitment to transferring knowledge and value to society. This third mission has been widely debated in the specialized literature, particularly from the perspective of the triple helix and quadruple helix theoretical frameworks that help us understand the complex interactions between academia, the private sector, the state, and civil society.

In Latin America, this process has been influenced by educational reforms, quality assurance policies, and growing demands for social relevance. According to Arocena and Sutz (2021), "Latin American universities face the challenge of generating knowledge relevant to contexts marked by inequality, poverty, and exclusion." In this context, university entrepreneurship emerges as a fundamental strategy for linking academic knowledge to the real needs of the region, acting as a bridge between academia and local communities. However, the institutional heterogeneity of the Latin American higher education system means that not all universities possess the same capacities, resources, or regulatory frameworks to implement effective and sustainable entrepreneurship programs.

In the case of Ecuador, reports from the Global Entrepreneurship Monitor (GEM) show that the country has an Early-Stage Entrepreneurial Activity Rate (TEA) that has ranged between 20% and 24% of the working-age adult population (Lasio et al., 2022; Lasio et al., 2024). Of this percentage, more than 70% of ventures are started out of necessity that is, in response to a lack

of formal employment alternatives rather than because of an identified market opportunity. This data is crucial, as it indicates that a large portion of Ecuadorian entrepreneurship is subsistence-based, characterized by low innovation, limited growth potential, and a high business failure rate within the first three years. Despite these indicators, Ecuador's Organic Law on Higher Education (LOES) has served as a catalyst by requiring higher education institutions (HEIs) to engage with society as an integral pillar of teaching and research, compelling universities to look outward and contribute to local development.

Various national studies agree that universities can play a strategic role in developing entrepreneurial skills, providing technical support, creating support networks, and strengthening local productive capacities (Mursulí, 2023; Melgarejo, 2024). However, a significant gap persists between institutional discourse and the effective implementation of sustainable models of university entrepreneurship. Pinheiro et al. (2015) note that, although there is a clear institutional political will evident in the development plans of Latin American higher education institutions, traditional academic culture still resists processes of applied technology transfer, and faculty members lack clear incentives to engage in business incubation or mentoring activities.

In light of this issue, this chapter poses the following research question: *How do Ecuadorian universities manage university entrepreneurship, and what are the structural challenges that limit its actual impact on the consolidation of local territorial development?* The overall objective is to analyze the management of university entrepreneurship in Ecuador, providing a robust empirical and theoretical foundation for the formulation of academic and public policies that go beyond mere welfare measures and aim for the co-creation of sustainable territorial value.

The Entrepreneurial University and the Third Mission

The concept of the entrepreneurial university is grounded in the triple helix model, which posits the interaction between universities, businesses, and the government as the cornerstone of knowledge-based development (Etzkowitz & Leydesdorff, 2000). From this perspective, the university assumes a proactive role in generating innovation, creating businesses *(spin-offs and start-ups)*, and facilitating technology transfer. This model goes beyond the mere commercialization of patents; it involves an internal cultural and organizational transformation that permeates all levels of the institution, from governance to teaching practices.

Clark (2018) argues that entrepreneurial universities are characterized by an innovation-oriented institutional culture, flexible organizational structures, and academic leadership committed to regional development. In the Latin American context, this model is adapted to incorporate elements of social inclusion, the solidarity economy, and community entrepreneurship (Arocena & Sutz, 2021). Unlike the Anglo-Saxon model, which focuses on high technology and venture capital, the entrepreneurial university in the Global South must be sensitive to the realities of the popular economy, environmental sustainability, and social cohesion. Martínez (2021) complements this vision by arguing that designing entrepreneurship education models in vulnerable contexts requires adapting methodological tools to realities where access to the internet, technology, and financial capital is limited, prioritizing frugality and contextualized innovation.

Entrepreneurship and Local Development

Local development is conceived as an endogenous process that seeks to improve a community's living conditions by leveraging its resources, capabilities, and local actors (Madoery, 2020). In this sense, entrepreneurship is a key instrument for revitalizing regional economies,

strengthening the productive fabric, and fostering social cohesion (Alburquerque, 2004). It is not merely about creating new businesses, but rather about a region's capacity to innovate, adapt, and generate collective well-being in a sustainable manner.

University-based entrepreneurship has a greater impact when it addresses real local challenges, such as youth unemployment, the popular and solidarity economy, social innovation, and environmental sustainability (Gibb, 2019; Fayolle & Gailly, 2015). When universities align their projects with the Sustainable Development Goals (SDGs), particularly SDG 8 (Decent Work and Economic Growth) and SDG 9 (Industry, Innovation, and Infrastructure), their contribution to local development becomes measurable and strategic. Jardon and Gierhake (2020) demonstrate that social innovation driven by academia in regions such as the Metropolitan District of Quito has made it possible to redefine urban and rural spaces, integrating ancestral knowledge with fair market dynamics and generating decent employment in historically marginalized sectors.

Innovation Ecosystems and the Quadruple Helix

For university entrepreneurship to be sustainable, it cannot operate in isolation. Recent literature has evolved toward the quadruple helix model, which incorporates "civil society" and "the media" as key actors in the co-creation of value (Carayannis & Campbell, 2020). In the context of local development, this means that Decentralized Autonomous Governments (GADs), chambers of commerce, organizations of the popular and solidarity economy (EPS), and local communities must be an integral part of the university entrepreneurship ecosystem. The university acts as a *hub* or coordinating node that facilitates interaction, trust, and the flow of resources among these actors.

Ecuador's Regulatory Framework and Its Implications

In Ecuador, the LOES and the regulations of the Council on Higher Education (CES) have institutionalized "engagement with society" as a mandatory cross-cutting priority. This has compelled higher education institutions (HEIs) to develop projects that are not merely charitable but rather generate capacity-building, technology transfer, and entrepreneurship. However, the regulations sometimes clash with the rigidity of accreditation and faculty evaluation processes, which still prioritize the publication of indexed scientific articles over real social impact or the creation of sustainable businesses a structural challenge to the consolidation of the entrepreneurial university in the country. This tension between the regulatory and the operational levels constitutes one of the system's critical bottlenecks.

Entrepreneurship Education: Institutionalization and Skills Development

The results show that Ecuadorian universities have progressively increased the incorporation of entrepreneurship as a cross-cutting theme in their curricula, as well as the creation of innovation centers and incubation programs (Lasio et al., 2022). This process reflects the institutionalization of entrepreneurship within Ecuadorian higher education, shifting from an extracurricular activity to a formal curricular component. There has been an adoption of agile methodologies such as *Design Thinking, Lean Startup*, and Project-Based Learning (PBL), which foster critical thinking and the resolution of real-world problems.

In community contexts, university-led projects have contributed to strengthening local capacities and developing social capital, especially when they are integrated with context-specific training processes (Melgarejo, 2024). However, the analysis reveals that in some cases a traditional

business approach predominates, with limited integration of social and solidarity economy models which is crucial in a country where the productive sector is dominated by microenterprises and community-based ventures.

Martínez (2021) emphasizes that the design of entrepreneurship education models in vulnerable contexts must prioritize adapting the curriculum to local needs, incorporating elements of collaboration, fair trade, and environmental sustainability as core competencies in the graduate profile.

Incubation and Support: Initial Progress and Structural Weaknesses

University incubators have strengthened the ideation and validation phases of business models; however, they exhibit critical weaknesses in the support provided after the initial phase (Barajas Romero, 2022). Many universities have excellent pre-incubation programs but lack acceleration or post-incubation mechanisms that would enable startups to access formal markets, scale their operations, or attract investment. This limitation directly affects the consolidation of startups, especially in vulnerable areas where access to financing is restricted and digital divides are wide.

Mian et al. (2016) note that business models developed in the classroom often fail when confronted with government bureaucracy, barriers to entry into the formal market, and competition from established companies. Their findings indicate that, without specialized technical support in legal, accounting, and marketing matters for at least the first 24 months, the survival rate of university-based startups drops below 30%. Vásquez-Luna (2023) demonstrates, in his study on the University of Guayaquil, that the specialization of incubators in specific territorial niches (such as the blue economy, community-based tourism, or sustainable agribusiness) significantly increases business survival rates, but requires a restructuring of institutional budgets and the allocation of dedicated staff measures that rarely materialize in practice.

Inter-institutional Coordination and Territorial Governance

Coordination among universities, local governments, and the productive sector is a determining factor for the sustainability of entrepreneurship. When inter-institutional coordination exists, higher levels of territorial impact and the strengthening of local networks are observed (Mursulí, 2023). For example, partnerships with municipal GADs provide access to physical spaces, temporary tax exemptions, or marketing channels at local fairs. Organizations in the popular and solidarity economy, for their part, contribute distribution networks and community trust that are difficult to replicate from within academia.

However, empirical evidence shows that this coordination is still in its early stages and depends largely on individual initiatives by faculty members or outreach coordinators, rather than on established institutional policies or long-term framework agreements. This situation limits the development of sustainable local entrepreneurial ecosystems, leading to fragmented efforts and the duplication of resources in some regions.

Financial Sustainability as a Structural Constraint

Financial sustainability emerges as one of the main constraints identified in the reviewed literature. Although seed capital funds exist (often administered through competitions such as "Emprende Up" or internal funds at higher education institutions), these tend to be temporary, limited in scope, and highly competitive (Lasio et al., 2022). In community-based ventures,

particularly within the popular and solidarity economy, initial dependence on university support can create vulnerability once that support ends.

ECLAC (2021) argues that the formal financial ecosystem in Latin America, including Ecuador, perceives popular and solidarity economy ventures as high-risk projects due to the absence of collateral, credit history, and stable cash flows. This organization proposes that universities should not only provide business consulting but also act as coordinators of community revolving funds and managers of solidarity-based guarantees mechanisms that have proven effective in microfinance initiatives across the Andean region.

Social and Territorial Impact: The Role of the Popular and Solidarity Economy

The ventures with the greatest social impact are initiatives linked to the social and solidarity economy, rural entrepreneurship, community-based tourism, and environmental sustainability (Franco, 2023; Jardon & Gierhake, 2020). These projects strengthen the social fabric, promote gender equity, and foster endogenous development processes, especially in vulnerable communities. Franco (2023) argues that the social and solidarity economy represents an alternative paradigm to extractive capitalism, where profit is not the ultimate goal but rather a means for the reproduction of community life and social justice.

De Sousa Santos (2021) demonstrates that community entrepreneurship driven by higher education not only generates income but also strengthens organizational capacities, local leadership, and participatory governance. The impact is measured not only in terms of financial profitability but also in the reduction of rural-to-urban migration, the preservation of ancestral knowledge, and the improvement of collective decision-making mechanisms.

Innovation Ecosystems: Similarities and Differences with the International Literature

One of the study's central findings is the fragmentation of university entrepreneurship ecosystems in Ecuador. While there are isolated efforts to coordinate with local governments and the private sector, these do not yet constitute a robust and permanent system. This finding is directly in line with the arguments put forward by Audretsch (2020), who maintains that the impact of university entrepreneurship depends on its integration into coordinated innovation ecosystems, where universities, businesses, the government, and civil society interact. In European countries and the United States, the studies reviewed by Audretsch show that the consolidation of stable inter-institutional networks promotes the scalability of startups and their entry into competitive markets.

In contrast, the Ecuadorian context shows weak institutionalization of these ecosystems. Unlike well-established models such as those in Spain or Germany where university incubators are integrated into regional innovation clusters with public-private funding in Ecuador, such coordination often depends on individual or ad hoc initiatives. However, the research also highlights successful local initiatives such as community-based tourism projects or rural associations supported by universities that demonstrate the potential of a collaborative territorial model. This suggests that the country does not lack capabilities, but rather structural mechanisms that ensure stability and continuity over time.

Organizational Culture and Resistance to Change

With regard to institutional culture, Guerrero and Urbano (2017) note that university entrepreneurship requires profound transformations in organizational culture, including incentives for faculty, administrative flexibility, and innovation-oriented leadership. The results of this research confirm this assertion. It was evident that, although formal entrepreneurship programs exist, traditional models of academic management centered on conventional teaching and theoretical research persist, with less emphasis placed on applied innovation and industry-academia collaboration.

The lack of academic recognition particularly in promotion and faculty ranking processes regulated by the Council for Higher Education for entrepreneurial engagement significantly limits faculty motivation to engage sustainably in incubation processes. Pinheiro et al. (2015) note that Latin American universities still retain bureaucratic traits inherited from centralized administrative models that slow down organizational innovation, creating a gap between the strategic planning outlined in institutional development plans and the effective implementation of sustainable programs in the local community. While Guerrero and Urbano (2017) found that in Spanish universities, entrepreneurial culture is strengthened when there is alignment between institutional mission, faculty incentives, and technology transfer policies, in the Ecuadorian context this alignment is still in its infancy and fragmented.

Social Approach to Entrepreneurship: Convergences with Latin America

A key finding of the research is that the ventures with the greatest territorial impact correspond to initiatives in the social and solidarity economy, rural entrepreneurship, and " " environmental sustainability. These results directly align with the arguments put forth by Arocena and Sutz (2021), who maintain that in Latin America, university entrepreneurship should be oriented toward social inclusion and the reduction of inequalities, rather than exclusively toward economic profitability. While in Anglo-Saxon models university entrepreneurship is primarily associated with high-growth technology startups (deep tech), in the Ecuadorian context the most significant impact is generated by smaller-scale community initiatives with high social added value.

This study confirms that, in vulnerable communities, strengthening social capital, community organizing, and women's participation generate multiplier effects on local development. This finding is consistent with Latin American studies that emphasize the role of universities as agents of social transformation and not merely as generators of technological spin-offs. However, unlike some cases documented in Brazil and Chile where national programs supporting university-based social entrepreneurship with permanent state funding have been established in Ecuador, these initiatives still lack a coordinated public policy that would enhance their scalability and long-term sustainability.

In comparative terms, the research confirms trends identified in the international literature: the importance of coordinated ecosystems, an entrepreneurial organizational culture, and collaborative governance. However, it shows that in the Ecuadorian context, these elements are still in the process of consolidation. Unlike countries with mature innovation ecosystems, the Ecuadorian model shows significant progress in training and ideation but faces structural limitations in financial sustainability, inter-institutional coordination, and business scalability.

Nevertheless, the study offers a fundamental distinguishing feature: it demonstrates that in contexts of vulnerability, the most significant impact is not measured exclusively in terms of economic growth, revenue, or the number of patents, but rather in the strengthening of the

social fabric, the development of local capacities, the reduction of exclusion gaps, and the preservation of cultural and environmental heritage. Consequently, the challenge lies not merely in replicating international models of entrepreneurial universities, but in building a model of our own one that is geographically relevant and socially inclusive that recognizes the central role of the popular and solidarity-based economy in Ecuador's productive structure.

Conclusions

The university has established itself as a strategic actor for local development in Ecuador by serving as a space that generates relevant knowledge, promotes entrepreneurship, and coordinates social innovation processes. Its contribution goes beyond the training of human talent, as it has the capacity to revitalize regional economies, strengthen the social fabric, and promote sustainable solutions to the most pressing local challenges.

However, the scope of their impact depends on the consolidation of sustainable institutional models, supported by long-term policies and evaluation mechanisms that allow for the objective measurement of their contribution to regional well-being. In this regard, it is necessary to move beyond a vision focused exclusively on academic productivity indicators and incorporate metrics that demonstrate the university's actual effects on the economic, social, and environmental development of regions.

Based on the findings, the following recommendations are formulated:

1. Strengthen applied research aimed at solving specific local problems, prioritizing social, environmental, and technological innovation with regional relevance.
2. Consolidate long-term strategic partnerships with decentralized autonomous governments, chambers of commerce, and organizations in the popular and solidarity economy, moving beyond reliance on individual faculty initiatives.
3. Implement monitoring and evaluation systems that measure the sustainability and impact of university initiatives over the medium and long term (5 to 10 years), beyond graduation indicators.
4. Reform faculty incentive systems (tenure tracks and promotions) to recognize entrepreneurial mentoring, business creation, and technology transfer as contributions equivalent to traditional scientific output.
5. Design financial instruments in collaboration with the cooperative sector and development banks that address the cash flow cycles and specific characteristics of community-based and social and solidarity economy (EPS) ventures.
6. Promote engagement models based on the co-creation of knowledge with communities, respecting ancestral knowledge and the cultural dynamics specific to each territory.

Together, these actions will strengthen the university's role as an agent of territorial transformation, contributing more effectively to sustainable development, inclusive innovation, and the creation of real opportunities for Ecuadorian communities.

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Redefining University Education Through a Data-Driven Intelligent Academic Decision-Making Model

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Introduction

Higher education is facing multiple pressures simultaneously: expanding access, maintaining student retention, improving learning outcomes, responding to changing labor markets, and demonstrating quality to society. These demands arise in an environment characterized by rapid technological advancement and the continuous generation of information within academic systems, virtual platforms, and administrative processes. UNESCO (2021) argues that educational renewal requires models that are more flexible, inclusive, and capable of guiding institutional action toward sustainable futures. In this context, Artificial Intelligence (AI), data science, and educational analytics can support the understanding of educational trajectories, provided their use is subordinate to pedagogical purposes and guarantees of equity, transparency, and accountability.

Higher education institutions generate data on enrollment, grades, attendance, interaction in virtual environments, assignment submissions, tutoring, faculty evaluation, and curriculum tracking. However, these records are often scattered across applications designed to meet different operational needs. This fragmentation makes it difficult to build a comprehensive picture of the student and leads to delayed decisions based on isolated reports or perceptions that cannot always be verified. Siemens and Long (2011) noted that the potential of analytics does not depend solely on having large volumes of information, but on converting that information into useful knowledge for intervention. Therefore, the central problem is not an absolute lack of data, but the absence

an architecture that transforms it, in a controlled manner, into criteria for action.

Educational analytics integrates statistical methods, data mining, visualization, and pedagogical interpretation to understand and optimize learning processes. Ferguson (2012) acknowledges that its growth is linked to the need to address institutional challenges using evidence, but also points out tensions related to data quality, interpretive capacity, and the purpose of metrics. Consequently, an indicator has no educational value in and of itself. Its meaning depends on the context, the operational definition used, the point in the learning trajectory at which it is interpreted, and the actions it enables. A decline in logins to a platform, for example, may indicate a lack of motivation, connectivity issues, changes in instructional planning, or a combination of factors; it should not automatically be labeled as a risk factor.

Studies on educational data mining and learning analytics demonstrate the potential to identify patterns, estimate probabilities, and personalize support (Baker and Inventado, 2014; Papamitsiou and Economides, 2014). A flagship example is Course Signals, which used alerts to provide early warnings of academic risk levels (Arnold and Pistilli, 2012). However, extrapolating a specific solution to institutions with different infrastructures, regulations, and cultures may yield limited results. A review of AI applications in higher education also highlights insufficient involvement of educators in the design and evaluation of systems, which shifts the focus from teaching toward technical efficiency (Zawacki-Richter et al., 2019).

This finding justifies an approach that keeps faculty judgment at the center of the decision-making process.

In Latin America, and particularly in Ecuador, universities must align technological innovation with obligations regarding quality, inclusion, data protection, and relevance. The Academic Regulations guide the organization of educational processes and the improvement of learning conditions (Council of Higher Education, 2022). However, institutions exhibit varying levels of digital maturity, infrastructure, and analytical capabilities. A viable model cannot assume perfect connectivity, historically complete data, or specialized teams in all units. It must allow for gradual implementation, define minimum quality standards, and incorporate mechanisms to explain why an alert or recommendation is generated. Based on this challenge, the research question is formulated as follows: How can a data-driven intelligent model be structured to integrate academic information, pedagogical criteria, and institutional governance in order to support timely, explainable, and ethically responsible decisions in higher education? The general objective is to develop the methodological and conceptual design of this model, laying the groundwork for its subsequent implementation and validation. The specific objectives are: to analyze the gaps between data availability and decision-making capacity; to identify and organize relevant sources and indicators; to design the components, relationships, and flows of an intelligent architecture; and to establish criteria for intervention, traceability, and continuous improvement.

The chapter's contribution is conceptual and methodological. It does not present a fully implemented platform, nor does it claim that the model has improved institutional indicators. The contribution consists of integrating, within a single architecture, dimensions that are often addressed

separately: data engineering and quality, analytics, explainability, pedagogical action, differentiated visualization, auditing, and organizational learning. This distinction avoids confusing an interface prototype with evidence of effectiveness and allows the proposal to be evaluated for its coherence, traceability, and implementation potential before subjecting it to testing with real users and data.

From Data Accumulation to Institutional Intelligence Digital transformation in higher education typically begins with the automation of registration, grading, and virtual classrooms. Although this process improves the availability of records, it can also perpetuate silos: each unit maintains data with different identifiers, update frequencies, and criteria. Institutional intelligence requires overcoming this logic of fragmented storage and establishing agreements on what each variable signifies, who is responsible for its quality, and for what purpose it may be used. Siemens and Long (2011) position analytics as a bridge between information and action; the bridge, however, requires traffic rules. Hence, governance, metadata, and traceability must be considered core components, not after-the-fact maintenance tasks.

The distinction between descriptive, predictive, and prescriptive analytics helps us understand the progression of the model. The first explains what happened through trends and indicators; the second estimates what might happen under certain conditions; the third suggests courses of action. This progression does not imply that one stage replaces another, nor that an automated recommendation constitutes a final decision. The quality of institutional reasoning depends on combining historical evidence, contextual knowledge, and professional deliberation. A prediction with

high technical accuracy may prove pedagogically useless if it comes too late, fails to identify modifiable factors, or is not accompanied by resources for intervention.

Learning Analytics and Educational Data Mining Baker and Inventado (2014) explain that educational data mining and learning analytics share methods but differ in emphasis, scales, and communities of practice. The former tends to delve into computational models of learning behaviors; the latter pays greater attention to interpretation and institutional use. The proposed architecture bridges both fields: it supports models that detect patterns, but requires that their outputs be translated into understandable indicators and verifiable actions. Thus, risk prediction is not presented as a definitive diagnosis, but rather as a signal that must be cross-checked against academic history, tutoring information, and environmental conditions.

The review by Papamitsiou and Economides (2014) highlights a diversity of techniques and results in empirical studies of educational analytics and data mining. This heterogeneity precludes the assumption that a single algorithm will perform equally well across all degree programs, cohorts, or delivery formats. Participation patterns in a face-to-face course are not equivalent to those in an online course; nor is it reasonable to apply the same inactivity threshold to courses with different instructional designs. Therefore, the model incorporates contextual segmentation, periodic evaluation, and recalibration. The system must record the scope within which each indicator is valid and allow academic leaders to review thresholds before converting them into operational alerts.

Early Warnings, Intervention, and Explainability

Course Signals demonstrated the value of promptly communicating risk information to students and instructors (Arnold and Pistilli, 2012). Its relevance to this proposal lies in linking analytics with intervention; its limitation as a standalone reference is that an isolated signal does not resolve institutional complexity. The model proposed here expands on this logic through a workflow that documents the source of the alert, its explanation, the person responsible, the agreed-upon action, and the subsequent outcome. This traceability makes it possible to distinguish between alerts that have been addressed, dismissed, or are pending, and prevents the system from being evaluated solely based on the number of predictions issued.

Explainability serves a technical, pedagogical, and ethical function. Technically, it helps detect dominant variables, errors, and changes in the data. Pedagogically, it allows the teacher to relate the recommendation to observable evidence. Ethically, it makes it possible to question an automated output and provide reasons to those who may be affected. A useful explanation should not be limited to presenting significance percentages that are difficult to interpret; it should indicate, in accessible language, which data influenced the result, from which period they originate, what limitations exist, and what actions are proportionate. The model, therefore, prioritizes reviewable recommendations over irreversible automated decisions.

Viberg et al. (2018) identify a landscape of growing interest in analytics in higher education, accompanied by barriers to adoption and uneven utilization. The availability of technology does not eliminate resistance, fears, or skill gaps. Faculty may perceive dashboards as surveillance tools if they are not involved in the

definition of indicators; administrators may overemphasize easily accessible metrics; and students may distrust profiles whose origin they do not know. For this reason, the architecture incorporates roles, permissions, training, and review procedures. Implementation must be a socio-technical process, involving institutional agreements, and not merely a software installation.

Zawacki-Richter et al. (2019) question the limited presence of the educational perspective in some research on AI in higher education. The model responds through the cross-cutting layer of

augmented pedagogical intelligence: AI complements, but does not replace, professional judgment. This means that a recommendation must be compatible with curriculum design, assessment strategies, and actual support capabilities. It also implies that faculty, tutors, coordinators, and students participate in evaluating the system. Quality is not limited to algorithmic performance; it includes understanding, timeliness, acceptability, equity, and usefulness for improving teaching.

The architecture confirms the premise of Siemens and Long (2011): institutional value arises when analytics inform decision-making. However, the proposal expands on that premise by making the intermediate steps explicit. It is not enough to collect, analyze, and visualize; it is necessary to manage definitions, explain results, assign responsibility, and track effects. This expansion is relevant because many implementations stop at descriptive dashboards. The model shifts the criterion for success from the amount of available data to the ability to generate timely, understandable, and reviewable actions.

In line with Ferguson (2012), the proposal agrees that educational analytics is shaped by institutional pressures and technological possibilities, but it emphasizes that indicators are situated constructs. A metric that is useful in one course may not be useful in another. Hence, the model incorporates metadata, segmentation, and threshold review. Its conceptual advantage is that it reduces the risk of universalizing signals. Its cost is a greater demand for governance and academic participation, which may slow down initial implementation, although it strengthens the system's legitimacy and sustainability.

Unlike Baker and Inventado (2014), the architecture establishes a deliberate connection between computational modeling and institutional interpretation. Data mining can uncover patterns that are not immediately obvious, but a correlation alone does not explain a cause or define the correct intervention. The C6 layer requires translating patterns into support options, and the

C8 retains evidence regarding the decision. This distinction protects against algorithmic determinism: a risk probability does not equate to a permanent characteristic of the student, but rather to a temporary signal subject to verification and change.

A comparison with Course Signals (Arnold and Pistilli, 2012) reveals both similarities and differences. Both approaches recognize the importance of timely alerts. The proposed model, however, broadens the scope from the signal to an institutional ecosystem that includes quality, explainability, role-based distribution, traceability, and improvement. This broader coverage facilitates adaptation to multiple decisions but also increases technical and organizational complexity. Therefore, a reasonable implementation should begin with a limited use case, evaluate its usefulness, and gradually expand the layers.

The evidence synthesized by Papamitsiou and Economides (2014) warns that analytical results depend on diverse methods, data, and contexts. Accordingly, the non- model does not prescribe a single algorithm. It allows for the selection of techniques based on the research question, the size and quality of the data, the need for explanation, and the cost of error. This flexibility prevents any single technique from becoming a universal solution, although it requires rigorous comparison criteria. The empirical phase must establish baselines, technical metrics, pedagogical indicators, and differentiated analysis to verify whether a recommendation yields benefits and for whom.

The obstacles identified by Viberg et al. (2018) show that adoption cannot be treated as an automatic consequence of a good interface. The architecture addresses this through roles, training, transparency, and decision logging. However, these elements will only work if accompanied by leadership, time to interpret data, and resources for

intervention. An institution could deploy the system and derive little value if teachers receive alerts without autonomy or support. Therefore, organizational maturity must be assessed alongside technological readiness.

The augmented pedagogical intelligence layer constitutes the most direct response to the gap identified by Zawacki-Richter et al. (2019) regarding educator participation. Instead of positioning the teacher as the end user of a prediction, it recognizes them as a designer of indicators, an interpreter, and the person responsible for intervention. This decision redistributes power and responsibility. It also raises the need to include students in governance, especially when designing explanations, consent mechanisms, or appeal processes. Participation must occur before deployment and continue during evaluation.

From UNESCO's (2021) perspective, reframing does not consist of digitizing existing practices, but rather of orienting technology toward more humane, inclusive, and sustainable educational relationships. The model can contribute to this goal if it identifies needs early on and coordinates support; it can also undermine it if used to monitor, classify, or exclude. The architecture does not eliminate this tension, but it establishes controls to make it visible: data minimization, explanation, oversight, equity analysis, and auditing. Ethics is incorporated as a design criterion rather than as a final statement.

In the Ecuadorian context, alignment with the Council on Higher Education (2022) requires that data-driven decisions respect academic organization and contribute to the quality of the educational process. Implementation should recognize the diversity of educational modalities, regions, and connectivity conditions. A modular architecture offers

an advantage: an institution can start with consolidated data sources and descriptive analytics while developing predictive capabilities. However, modularity does not justify neglecting governance; even a basic dashboard can lead to unfair decisions if definitions and access rights are unclear.

The model's main strength is its systemic approach. It integrates technical, pedagogical, and organizational components and creates a cycle linking diagnosis, intervention, and institutional learning. Its limitations are also clear. First, the proposal is based on a limited analytical review and will need to engage with additional literature in later phases. Second, conceptual coherence does not guarantee technical feasibility or adoption. Third, the indicators and thresholds have not yet been validated with university communities. Fourth, the architecture may require resources that some institutions do not possess, thus necessitating a strategy of gradual maturation.

These limitations define the research agenda. The next phase must submit the architecture for review by experts in education, data, ethics, and management; develop a priority use case into a minimum viable product; evaluate the quality and interoperability of data sources; and conduct usability testing with different user roles. Afterward, a pilot study can be conducted with an approved protocol, measuring technical performance, understanding of explanations, timing of intervention, acceptance, and academic outcomes. Only then will it be legitimate to assess effectiveness and compare the model with existing institutional procedures.

Conclusions

The study answered the research question by designing an architecture that integrates data, pedagogical criteria, and governance across ten layers. Its logic begins with documented sources and quality assurance processes

; it continues with indicators, analytics, and explainability; and culminates in intervention, visualization, traceability, and continuous improvement. Augmented pedagogical intelligence permeates the entire framework to ensure that AI supports professional judgment rather than replacing it.

The proposed reframing lies in changing the meaning of university data. Instead of using it solely for administrative reporting or ex post control, it is conceived as input for understanding student trajectories, anticipating needs, and coordinating support. This shift requires recognizing that metrics are interpretations, that predictions express uncertainty, and that every recommendation must be linked to a proportionate action, a responsible person, and a follow-up mechanism.

This architecture offers advantages over fragmented approaches: it links data quality to analytical reliability, integrates explanation and oversight, tailors views to specific roles, and tracks the impact of interventions. At the same time, it requires institutional capacity, semantic agreements, data protection, analytical literacy, and community participation. Its implementation should be gradual and begin with questions of high pedagogical value, not with the indiscriminate adoption of algorithms.

The scope of this work is conceptual. The visual prototype does not constitute a functional platform, and its demonstrative content does not represent institutional results. No models have been trained, no real databases have been integrated, and no user testing has been conducted. Therefore, no claims are made regarding improvements in performance, retention, or efficiency. The current contribution is an auditable framework that allows for the formulation of hypotheses, the organization of development, and the definition of evaluation conditions.

Future research should validate content and usability with experts and users, develop a controlled pilot, analyze performance and equity, and study the relationship between alerts, decisions, and impact. It will also be necessary to compare configurations by program type and discipline. Under these conditions, the model can contribute to an evidence-based university culture, in which technology expands the capacity for care, reflection, and improvement without displacing human responsibility.

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Employability as an Indicator of Quality and Social Development: Design of an Inclusive Pedagogical Model in Technical Education

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Introduction

Graduates' employability is currently one of the main indicators of quality for institutions of higher education. In a global context characterized by automation, digital transformation, economic globalization, and constant changes in labor dynamics, universities and technical institutes face the challenge of ensuring that educational programs are relevant and aligned with the demands of the workforce (Abas et al., 2025; Adegbite, 2024; Adegbite and Hoole, 2024).

Technical and vocational education bears the responsibility of training professionals capable of responding to contemporary social, economic, and technological needs. However, numerous studies have shown that there is a gap between the competencies developed during academic training and the skills required by employers. This issue directly affects graduates' entry into the workforce and highlights the need to strengthen the coordination between the curriculum, professional internships, institutional partnerships, and graduate support (Alenezi, 2024; Arevalo-Cordovilla et al., 2024).

This context raises the question: What actions can be taken to strengthen the relationship between education and employability in technical and vocational education from the perspective of quality and social development? To address this question, the main objective of the study is to design a pedagogical model for strengthening the relationship between academic training and employability in technical-vocational education, based on a university case study that identifies the pedagogical factors that facilitate or limit this integration.

For this reason, the chapter is structured into three main sections. The first analyzes the category of employability as an indicator of quality and social development. The second presents the methodological process and the results obtained in the study conducted at the Bolivarian Institute of Technology. Finally, the third section provides a descriptive analysis of the results, aimed at understanding the implications of these findings for higher technical education and their contribution to sustainable development.

Contextualization of the Issue: Employability as an Indicator of Quality and Social Development

The relationship between education and work has historically been one of the main challenges facing higher education systems. The expansion of university and technical enrollment in Latin America has not always been accompanied by effective mechanisms for labor market integration, which has led to situations of professional unemployment, underemployment, and a disconnect between education and the labor market.

Various international studies have shown that employability does not depend solely on the acquisition of technical knowledge, but also on the development of transferable skills, digital skills, leadership, adaptability, and the ability to work collaboratively. Furthermore, the relationship between educational institutions and the productive sector is a key factor in strengthening the transition to employment.

In the analysis of technical and vocational education, employability cannot be understood solely as an external outcome determined by labor market factors. It must also be viewed as an indicator of the internal coherence of the educational process: when there is pedagogical alignment between the curriculum, learning experiences, and the demands of the labor market, labor market integration tends to be strengthened. Otherwise, gaps emerge that reflect a disconnect between what the institution teaches and what the workplace requires (Alenezi, 2024; Arevalo-Cordovilla et al., 2024)

In the case of Ecuador, the structural characteristics of the labor market such as the limited creation of managerial positions and the predominance of family-owned businesses restrict graduates' career mobility. Furthermore, sociodemographic variables such as gender, socioeconomic vulnerabilities, and ethnic identity influence youth unemployment rates (Radio Nacional, 2023)

In this context, partnerships between universities and industry are a key strategy for strengthening employability, as they promote collaborative curriculum development, joint training, and access to hands-on experiences in real-world work settings (Arevalo-Cordovilla et al., 2024). When these collaborations are extended to government and community organizations, they enhance the relevance of the curriculum and better prepare graduates to meet the demands of the workforce.

Despite the existence of these strategies, a gap persists between the competencies developed by graduates and employers' expectations, highlighting the need to adopt structured pedagogical approaches that integrate academic training and employability as a continuous process. Strengthening cross-cutting competencies such as leadership, effective communication, collaborative work, innovation, and self-management has been identified as a critical element in facilitating the transition to the labor market (Bolli et al., 2021).

In the specific case of the Bolivarian Technological Institute (ITB), the implementation of institutional systems to measure the employability of its graduates has yielded relevant data. However, challenges persist due to the fragmentation of information and technological limitations that affect the efficiency of graduate tracking. According to institutional reports, only 46.7% of academic coordinators systematically incorporate employability data into curriculum updates, while 66.7% of technical staff report technological shortcomings. In terms of outcomes, 40.7% of graduates are employed in the formal sector, 39.5% are actively seeking employment, and 11.1% have started their own businesses (Chen and Gan, 2021)

Although the three programs analyzed Business Administration, Automotive Mechanics, and Podiatry show similar rates of perceived employability, statistical analyses indicate that there are no significant differences among them, suggesting the need to strengthen institutional strategies to ensure that educational quality translates into effective labor market integration . This context demonstrates that employability in technical and vocational education depends on a structured pedagogical integration of learning, practical experiences, and the demands of the workplace (Echeverría-Guzmán, et al., 2025)

It should be noted that, although the Bolivarian Technological Institute has implemented mechanisms for tracking graduates and strategies for engaging with the business community,

challenges persist regarding the fragmentation of institutional information, technological limitations, and the need to incorporate employability outcomes into curriculum update processes.

The central issue of the study, therefore, lies in understanding whether the academic training provided in technical-vocational programs truly facilitates graduates' effective entry into the workforce. The following question could guide part of the study: Is there a relationship between academic training and the employability of graduates in technical-vocational education? For this reason, the authors propose as a general hypothesis that a coherent pedagogical integration of curriculum, competency-based training, university-industry partnerships, and institutional follow-up significantly increases graduates' chances of employability.

In light of this issue, this chapter proposes the design of a pedagogical model to strengthen the relationship between academic training and employability in technical and vocational education, based on a case study that identifies the pedagogical factors that facilitate or limit this integration.

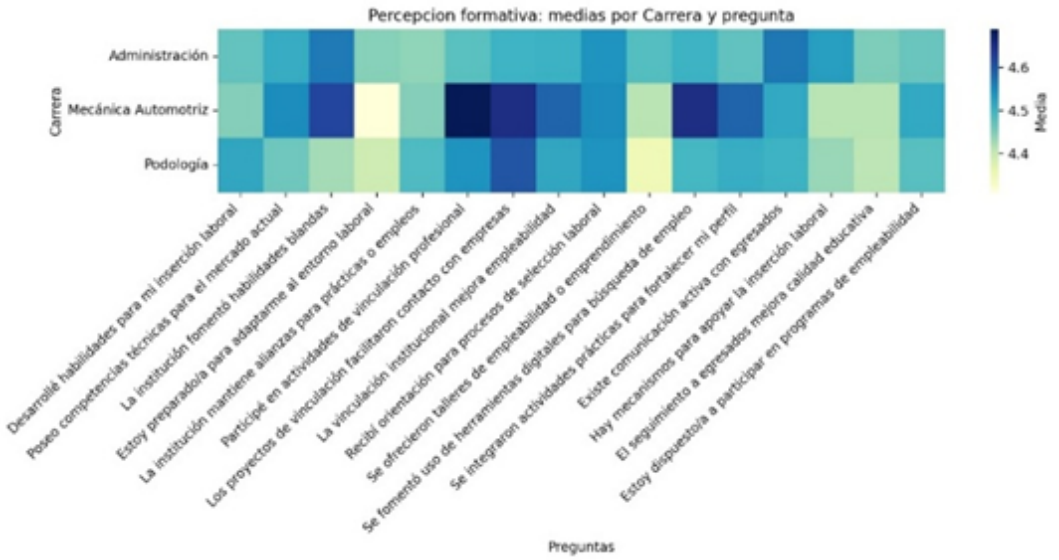
The study's results confirm that the overall perception of the quality of education in the three programs analyzed Business Administration, Automotive Mechanics, and Podiatry is exceptionally high, with averages close to 4.5 on a scale of 5. However, statistical analysis of employability reveals a significant disconnect between perceived satisfaction and actual job placement outcomes. In particular, the Automotive Mechanics program, despite its high perceived quality, exhibits the greatest positive deviation toward the category of lowest employability (standardized residual of 0.53). These findings call for a strategic review of curriculum and academic training models to ensure that perceived quality effectively translates into career success.

Methodological Framework and Training Consistency

The study is based on a multivariate methodology that compares perception means, as shown in Figure 1: a heat map, averages with 95% confidence intervals, and the association between degree program and employment status using the chi-square test (standardized residuals). The statistical consistency in the overall average educational perception is notable: although Automotive Mechanics shows the highest average score, the comparison with overlapping confidence intervals indicates that the differences between degree programs are statistically minimal. This suggests that the educational quality perceived by graduates is a cross-cutting institutional attribute, rather than a program-specific strength.

The heat map allows us to identify patterns by degree program: darker blocks indicate higher averages in that dimension. Cells with positive residuals indicate overrepresentation (observed frequency higher than expected), while negative residuals indicate underrepresentation. Small residuals and a non-significant p-value reinforce the absence of relevant differences between degree programs, confirming the homogeneity of the educational experience.

Figure 1. Heat map

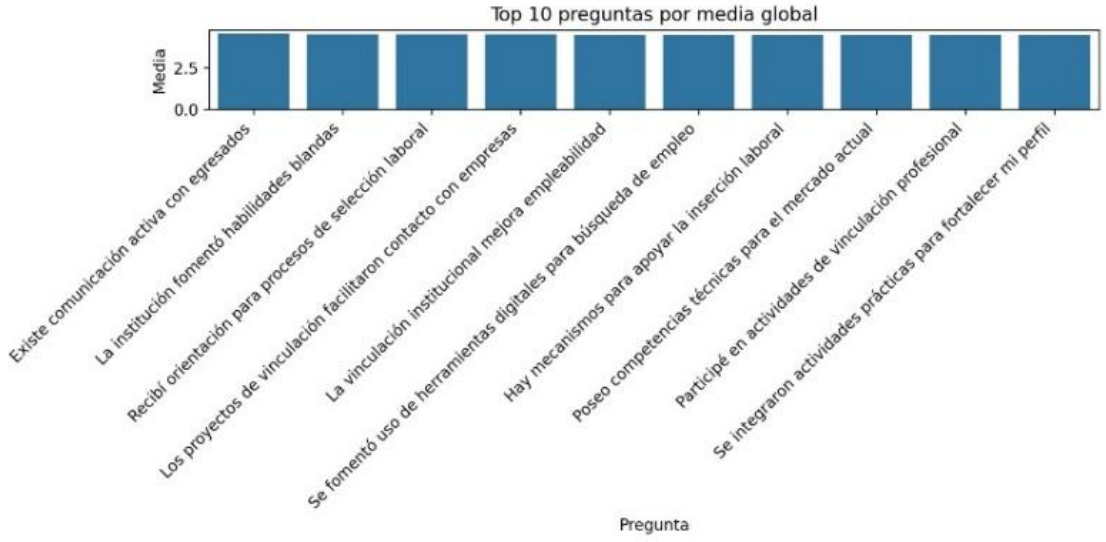


Source: the authors (2026)

Specific Disparities in Perception by Degree Program

Despite the high overall average, the heat map allowed us to identify critical nuances in the educational experience. However, the second analysis, conducted using a box plot, highlights the items rated highest overall, which is useful for articulating the narrative of educational strengths. The highest scores correspond to soft skills and institutional satisfaction. Overall, the results reflect a coherent educational model, although there is room for improvement in effective transition to the labor market.

Figure 2. Questions by overall average.



Source: the authors (2026)

To summarize the specific disparities in perception, Table 1 presents a comparative analysis that summarizes the key findings by degree program

Table 1. *Educational perceptions and areas for improvement by degree program*

Degree Program	Specific Areas of Focus	Details of the findings (averages between 4.4 and 4.6)
Public Administration	Benchmark. Strong and consistent perception across nearly all dimensions.	Includes skill development, competency possession, and partnership effectiveness. Most respondents give ratings of 4 or 5 on competency-related questions.
Automotive Mechanics	Leadership in soft skills.	The perceived effectiveness of institutional partnerships for internships or jobs is slightly lower than in Business Administration. High ratings for soft skills do not correlate with successful job placement.
Podiatry	A gap in technical competence and adaptability.	Lower scores on "I possess technical competencies for today's job market" and "I am prepared to adapt to the work environment." Educational vulnerabilities in hard skills and preparation for the workplace.

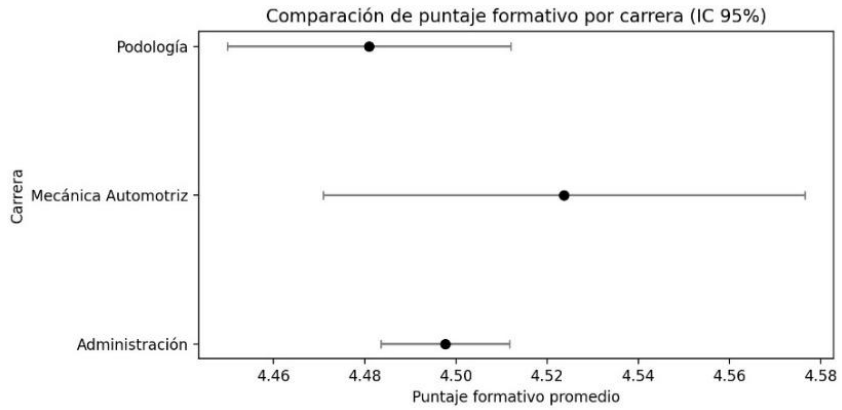
Source: the authors (2026)

Critical Discrepancy: Perception vs. Employability

The standardized residual analysis (chi-square) is the most significant finding, as it measures whether a degree program is overrepresented or underrepresented in the employability category ("1") or lower employability category ("0").

- Automotive Mechanics: This program has the highest positive standardized residual (0.53) in category '0' (Lower Employability/Unemployment). This means that the proportion of Automotive Mechanics graduates in the lower employability category is significantly higher than expected. This implies a satisfaction-unemployment paradox: despite the high perceived quality, the job market is not absorbing these graduates at the expected rate.
- Podiatrics: also shows overrepresentation in category '0' (Lowest Employability), with a standardized residual of 0.25. The perceived lack of technical skills and adaptability correlates with actual difficulty in entering the workforce.
- Business Administration: serves as a benchmark, with a negative residual in category '0' (-0.25) and a positive residual (0.11) in category '1' (Employability). This indicates that the perceived high quality of education translates into more favorable and expected employability outcomes in the market.

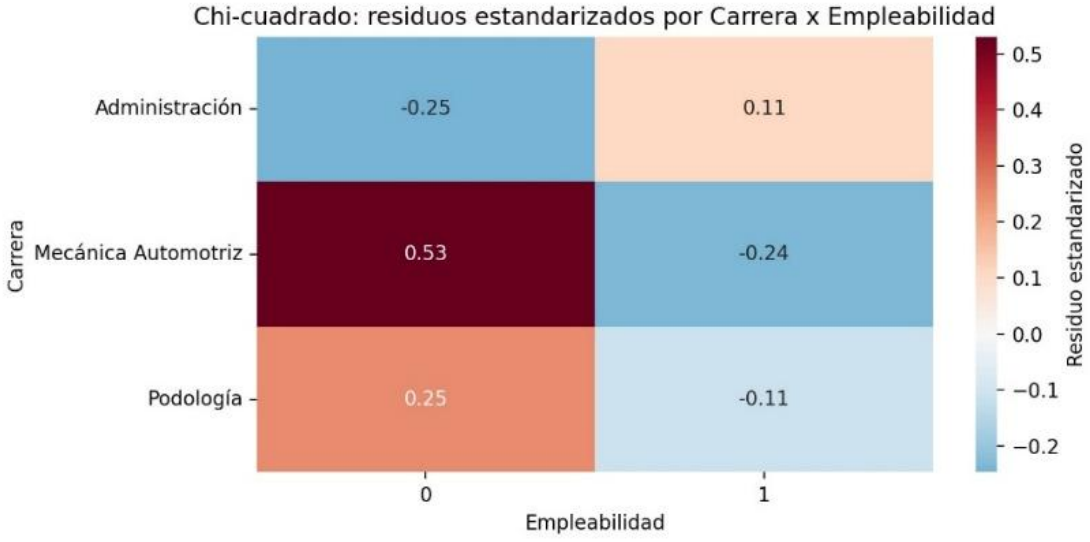
Figure 3. Means by degree program with confidence intervals



Source: the authors (2026)

This figure shows the mean training scores by degree program and their 95% confidence intervals. The visual overlap of the intervals indicates that there are no significant differences between degree programs, reinforcing the institutional consistency of the training model.

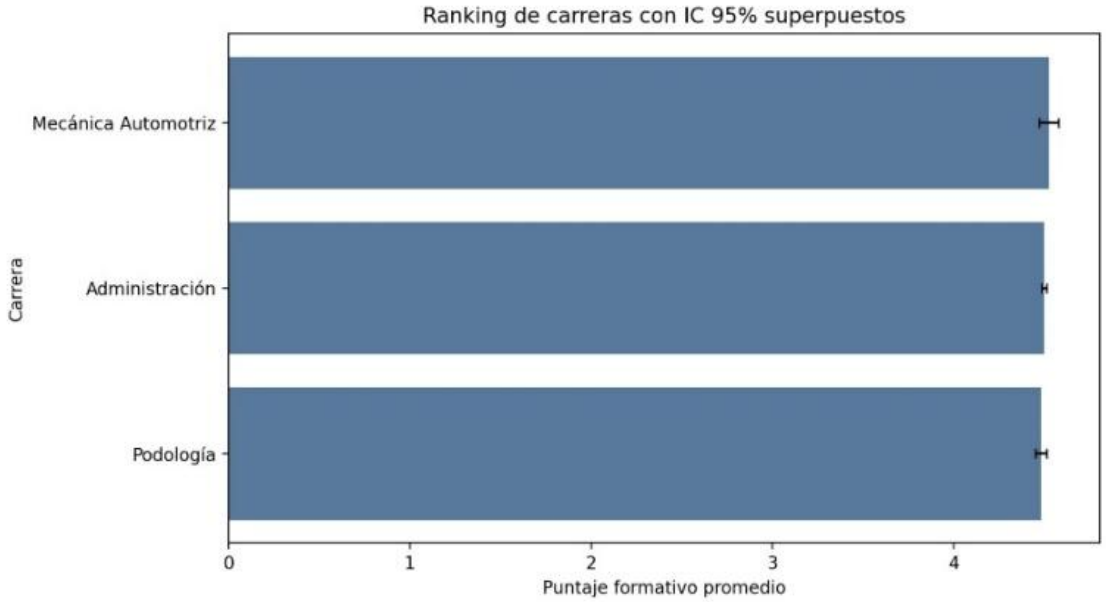
Figure 4. Standardized chi-square residuals.



Source: the authors (2026)

Positive residuals indicate overrepresentation, and negative residuals indicate underrepresentation. In this case, the values are small, which is consistent with the non-significant p-value and confirms the homogeneity of perceived employability across majors.

Figure 5. Visual comparison of means and confidence intervals



Source: the authors (2026)

The figure shows that the confidence intervals for the three degree programs overlap extensively, which visually confirms that the differences are small and statistically insignificant. In practical terms, the educational averages of the degree programs appear similar, reinforcing the idea of a uniform institutional quality model.

- Scientific and Strategic Recommendations

To maximize the impact of these results, a dual approach is required:

- Research focused on Automotive Mechanics: prioritize in-depth qualitative research that analyzes external barriers to employability and the validity of institutional partnerships.
- Curricular intervention in Podiatry: Focus curriculum improvements on hard skills and workplace adaptation, with potential technological enhancements and greater integration of internships.
- Commitment Capitalization: The high willingness to participate in employability programs provides a solid foundation for implementing follow-up and supplemental training programs with a high probability of acceptance and success.

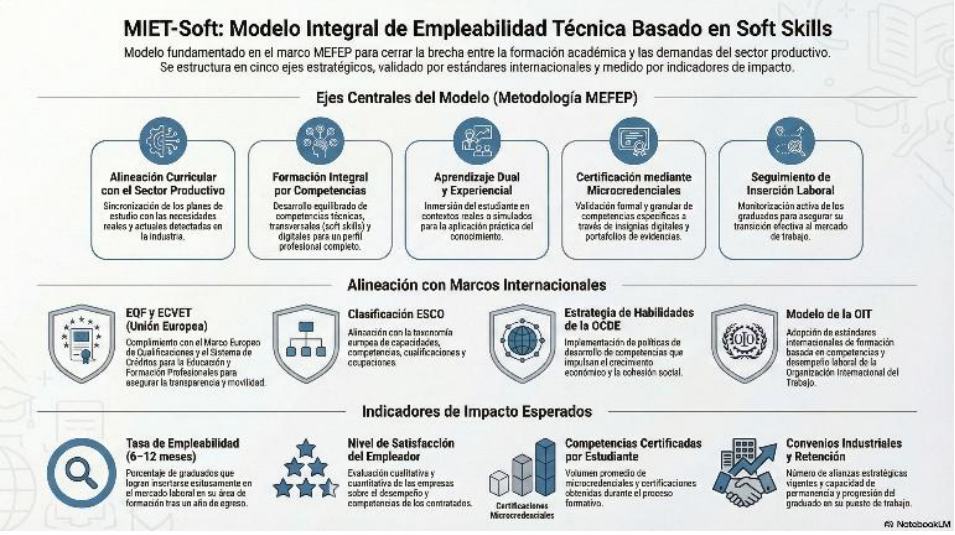
- In light of these considerations, the MIET-Soft Pedagogical Model is proposed:

Model for Strengthening Academic Training and Employability in Technical and Vocational Education

- Core Pillars of the Model:
    - Curriculum alignment with the productive sector.
    - Integrated, competency-based training (technical, cross-cutting, and digital).
    - Dual or experiential learning (in real or simulated contexts).
    - Certification and evidence of competencies (microcredentials, portfolios).
    - Employment placement and graduate follow-up.

- Alignment with International Frameworks
  - European Qualifications Framework (EQF): levels based on learning outcomes.
  - European Credit System for Vocational Education and Training (ECVET): accumulation and transfer of credits.
  - ESCO Framework: alignment with European occupational classifications.
  - OECD Competency Strategy: development of competencies relevant to the workforce.
  - ILO Competency-Based Training Model: performance-oriented vocational standards.
- Expected Impact Indicators
  - Graduate employability rate (6–12 months).
  - Employer satisfaction level.
  - Certified competencies per student.
  - Partnership agreements with the private sector.
  - Graduate retention and career progression.

Figure 6. MEFEP Pedagogical Model



Source: the authors (2026)

The results show that the relationship between academic training and employability does not depend exclusively on the acquisition of technical competencies, but rather on the existence of a structured pedagogical link between the educational process and the workplace. Although perceptions of professional preparedness generally show favorable trends, statistical analyses reveal variations across degree programs and differences in the impact of the Composite Score on employment status.

The application of inferential tests chi-square, ANOVA, and logistic regression revealed that employability is not distributed uniformly across academic programs, suggesting that curricular factors, industry engagement strategies, and institutional support mechanisms influence labor market entry in different ways. This finding confirms that employability cannot be understood

solely as a result of the economic context, but rather as a manifestation of the internal coherence of the educational model. Furthermore, the dimensions evaluated employability skills, university–private sector partnerships, training for labor market entry, and graduate follow-up demonstrate that institutional coordination is a determining factor. When these dimensions operate in a fragmented manner, the educational impact is weakened; conversely, when they are integrated within a systemic framework, the likelihood of effective labor market integration increases. The involvement of external actors through university–industry collaboration strategies (CUI) reinforces the contextual relevance of the analysis but also highlights the need to formalize such coordination within a structured pedagogical model. It is not enough to establish partnerships; it is essential that these translate into curricular, methodological, and assessment mechanisms consistent with educational objectives. In this regard, the study's findings support the need to design a pedagogical model that systematically integrates academic training and employability, moving beyond isolated approaches focused solely on technical competencies or one-off outreach initiatives. The empirical evidence gathered during the 2020–2025 period supports the conclusion that improving employability requires a comprehensive pedagogical transformation, grounded in data and oriented toward institutional coherence.

Conclusions

This study analyzed the relationship between academic training and employability in technical and vocational education, demonstrating that graduates' entry into the workforce is not determined exclusively by external market factors, but rather by the way in which the institution pedagogically aligns its educational processes with the productive environment. The results obtained from the descriptive and inferential analysis show that there are significant differences between academic programs and that the perceived level of training influences the probability of employment. This evidence confirms the need to strengthen internal coherence between the curriculum, institutional partnerships, job placement strategies, and graduate follow-up. In response to this assessment, we propose the design of a pedagogical model aimed at strengthening the relationship between education and employability, conceived as an integrative framework that links competencies, university-business sector partnerships, institutional support, and continuous assessment. This model is not limited to improving employment indicators but seeks to consolidate a systemic educational approach that ensures relevance, quality, and sustainability in technical and vocational education.

Consequently, employability must be viewed as a strategic indicator of pedagogical quality and not merely as a statistical outcome. Strengthening this relationship requires evidence-based institutional decisions, coherent curricular integration, and ongoing coordination with the workforce.

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Teacher Training and Its Influence on the Academic Outcomes of Students with Disabilities: A Case Study in Higher Education

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Introduction

Contemporary higher education faces an ethical, pedagogical, and social imperative: to ensure that access to college translates into meaningful participation, retention, meaningful learning, and timely graduation for all students, including those with disabilities. In this context, inclusion cannot be reduced to a policy statement or the formal enrollment of historically excluded students; it involves transforming institutional culture, revising teaching practices, and ensuring reasonable accommodations that eliminate barriers to learning and participation. Recent literature agrees that the training of university faculty is a decisive factor in moving from declarative inclusion to effective inclusion (Carballo and Cotán, 2024; Moriña et al., 2020).

In the context of students with language disabilities, this challenge takes on a particular complexity. Broca's aphasia, characterized by difficulties in verbal and written production, can limit the fluent expression of ideas, oral participation, academic interaction, and the demonstration of learning in traditional formats. However, these limitations should not be interpreted as a lack of comprehension, analytical ability, or academic potential. From an inclusive perspective, the problem lies not exclusively in the student's condition, but in the interaction between their communicative characteristics and the barriers of the university environment: rigid assessments, limited diversity of means of expression, poor digital accessibility, faculty unfamiliarity with the condition, and a lack of institutional coordination.

The presentation that gave rise to this chapter presented a case study on the influence of faculty training on the academic outcomes of a student with Broca's aphasia enrolled in the Master's Program in Interdisciplinary Studies on Disability at the Bolivarian University of Ecuador. To adapt it into a book chapter, the text has been expanded from an argumentative and educational perspective, incorporating a more in-depth discussion of inclusive higher education, Universal Design for Learning, flexible assessment, digital accessibility, and the responsible use of assistive technologies. This expansion addresses the format required for book chapters, which calls for moving beyond the structure typical of a scientific article and developing a theoretical, methodological, and applied reflection with greater conceptual depth.

The guiding question of the chapter is as follows: How does teacher training in inclusion influence the academic outcomes, participation, and retention of a college student with a language disability? In line with this question, the general objective is to analyze the relationship between teacher training, inclusive pedagogical strategies, institutional support, and the academic trajectory of a student with Broca's aphasia in higher education. As a working hypothesis understood in a comprehensive qualitative and sense it is argued that teacher training in inclusion promotes the implementation of accessible pedagogical and assessment strategies which, when combined with institutional support, positively impact the student's participation, autonomy, retention, and academic performance.

The chapter is organized into seven sections. First, the problem situation and the conceptual framework underpinning the relationship between teacher training and university inclusion are developed. Second, language disability and Broca's aphasia are analyzed as conditions that require specific communicative and pedagogical supports. Third, the methodological process of the case study and its main results are presented. Fourth, it delves into Universal Design for Learning and inclusive assessment as ways to anticipate barriers. Fifth, it examines timely student support and institutional shared responsibility. Sixth, it incorporates an up-to-date analysis of digital accessibility, assistive technologies, and responsible artificial intelligence. Finally, an integrative argument is developed, and conclusions are presented that are oriented toward teacher training, university administration, and the development of sustainable inclusive policies.

Teacher Training and University Inclusion: Problematic Situation and Conceptual Foundations

Teacher training in inclusion can be defined as a systematic, continuous, and context-specific process that enables faculty to develop knowledge, attitudes, pedagogical competencies, and ethical standards to respond to student diversity. It is not merely a matter of knowing diagnostic categories or institutional policies; it involves learning to identify barriers, design accessible environments, diversify resources, make assessment more flexible, and build pedagogical relationships based on the recognition of each student's dignity and potential. In higher education, this training is particularly relevant because university faculty typically possess a high level of disciplinary specialization but do not always have sufficient pedagogical training to address the functional, cognitive, sensory, communicative, and socio-emotional diversity present in classrooms.

The international literature shows that one of the recurring demands from university faculty is to receive specific training on disability, accessibility, reasonable accommodations, and Universal Design for Learning. Moriña et al. (2020) analyzed the training needs of academics regarding inclusion and disability and noted that faculty training must address conceptual knowledge, methodological strategies, inclusive assessment, and positive attitudes toward diversity. This finding is significant because it helps us understand that inclusion does not depend solely on goodwill: it requires preparation, support, and institutional conditions that enable these transformations to be sustained over time.

Along the same lines, inclusive pedagogy argues that teachers should not design instruction based on a supposed "norm" and then add accommodations for those who deviate from it. Rather, they should expand learning opportunities for everyone from the outset, recognizing that diversity is an inherent characteristic of any university group (Florian and Black-Hawkins, 2011). This approach shifts the focus from individual deficits to pedagogical and institutional responsibility. Therefore, the central question is not what the student lacks, but rather what barriers the environment creates and what teaching decisions can promote their learning and participation.

The literature on inclusion in higher education confirms that barriers are not explained solely by students' individual characteristics, but by the way institutions organize the curriculum, teaching, assessment, and support services. Echeita Sarrionandia and Duk Homad (2008) argue that inclusion requires identifying and reducing the barriers that limit attendance, learning, and participation. This perspective remains fully relevant in the university setting: admitting a student with a disability is merely the starting point; the substantive challenge lies in ensuring that the

student can participate on an equal footing and progress in their academic journey without academic formats becoming avoidable obstacles.

Recent studies reinforce this view. Bartolo et al. (2025) show that students with disabilities in higher education simultaneously demand personal empowerment, equitable institutional systems, and individualized responses when necessary. Cotán et al. (2024), in reviewing inclusive methodological strategies in higher education, highlight the diversification of methodologies, resources, and forms of participation as conditions for reducing barriers. In turn, Dyliaeva et al. (2024) demonstrate that even in institutions with inclusion policies, difficulties persist regarding faculty preparation, accessibility, and the coordination of support services. Taken together, these contributions allow us to interpret faculty training as part of a broader system of university transformation rather than as an isolated action.

The attitudinal dimension of training is also crucial. Sharma and Sokal (2015) demonstrated that training processes can change beliefs and attitudes toward inclusion an aspect that is particularly relevant when faculty must address disabilities that are less visible or less well-known. Training, therefore, must combine knowledge, reflection on one's own conceptions, and opportunities to practice specific pedagogical decisions. In the case analyzed, this combination facilitated an understanding of Broca's aphasia in terms of its communicative and pedagogical implications, preventing the automatic association of expressive difficulties with reduced intellectual capacity.

In the case analyzed, the teachers' prior training served as a structuring variable. The teachers did not approach the situation by improvising, but rather drew on a body of knowledge and attitudes that enabled them to understand Broca's aphasia, anticipate communication difficulties, select supports, adapt assessment methods, and coordinate actions with academic advising, academic coordination, and student wellness services. This coordination created an environment in which the student was able to demonstrate his learning through alternative means, increase his autonomy, and progressively participate in academic activities.

The problem that gives this study its purpose can be summarized as the gap between inclusive discourse and actual practices. Although many universities recognize inclusion as an institutional principle, attention to students with less visible disabilities such as language disabilities is often lost amid general procedures. When faculty lack specific training, rigid assessment practices, uniform communication requirements, and forms of participation focused almost exclusively on oral communication may persist. In contrast, when faculty are properly trained, a student's communication challenges are interpreted as a need for pedagogical mediation rather than as an academic disability.

From this perspective, teacher training fulfills at least four functions. The first is cognitive, as it provides information on disability, accessibility, and supports. The second is methodological, as it offers tools for flexible, y planning, teaching, and assessment. The third is attitudinal, as it fosters an empathetic and non-stigmatizing perspective. The fourth is institutional, as it facilitates dialogue with other support services and strengthens collaborative decision-making. These functions help explain why teacher training influences academic outcomes beyond grades: it impacts participation, confidence, a sense of belonging, retention, and the likelihood of graduation.

Language Disability, Broca's Aphasia, and Barriers in Higher Education

Aphasia is an acquired language disorder generally associated with brain injuries and can compromise, to varying degrees, oral expression, writing, reading, and comprehension. The American Speech-Language-Hearing Association (n.d.) describes it as a communication disorder

that affects the ability to express and/or understand language following a brain injury. In Broca's aphasia, the primary difficulty is typically observed in language production, characterized by non-fluent speech, articulatory effort, short sentences, and limitations in verbally organizing complex ideas; the manifestations depend on the location and extent of the lesion and on the individual's clinical course (Jianu et al., 2021). However, expressive difficulty does not in itself equate to a global loss of comprehension or reasoning; therefore, it is essential to differentiate between the student's observable communicative competence and their cognitive ability. This distinction is fundamental in higher education, where traditional assessments often prioritize oral presentation, speed of response, and extensive written production.

When the university environment fails to recognize these particularities, academic and emotional barriers may arise. Academic barriers include difficulty participating in debates, answering questions immediately, delivering conventional oral presentations, writing papers under time pressure, or participating in highly verbal group activities. Emotional barriers include communication anxiety, frustration at the inability to fluently express understood ideas, fear of public evaluation, and the risk of social isolation. Frade et al. (2023) emphasize that the experience of living with aphasia can affect not only communication but also a person's identity, participation, and well-being.

From a person-centered perspective, intervention and supports must take into account meaningful goals, communication preferences, and participation in real-world contexts. Hinckley et al. (2023) emphasize that care for people with aphasia must move beyond an exclusively clinical approach to incorporate autonomy, participation, and shared decision-making. Applied to the university setting, this principle requires asking which forms of communication best allow students to demonstrate their knowledge, which supports are functional, and which barriers can be removed without altering the intended learning outcomes.

Emerging technologies also open up specific possibilities for language production. Van Vaals et al. (2024) explore the use of language models to complete fragmented utterances associated with Broca's aphasia an approach that is still experimental but illustrates the potential of artificial intelligence as a support for expression. Their incorporation into education, however, must be approached with caution: the tool can facilitate the organization or formulation of a message, but it should not replace the student's intellectual authorship or be used to automatically infer their competence.

An inclusive approach requires that these barriers be analyzed as a product of the interaction between the student and the context. In this regard, a classroom that only allows learning to be demonstrated through rapid oral presentation can become an exclusionary environment for a person with Broca's aphasia. In contrast, a classroom that incorporates visual aids, preemptive questions, extra time, technology-supported written responses, clear rubrics, and alternative modes of participation broadens the possibilities for demonstrating competencies. Communicative accessibility thus becomes an essential component of educational quality.

In the case study, the main initial barriers were related to oral participation, social interaction, emotional security, and the expression of knowledge in standard assessment formats. However, early identification of the condition made it possible to implement pedagogical and administrative supports. This timely detection was important because it prevented communication difficulties from being interpreted as disinterest, poor preparation, or limited comprehension. The faculty's understanding of the condition enabled a more accurate pedagogical assessment of the student's academic progress.

The analysis of language disabilities in higher education also requires broadening the conception of academic outcomes. In a traditional approach, outcomes may be limited to grades, course completion, or program completion. In an inclusive approach, outcomes include progress in autonomy, strategic use of supports, increased participation, reduction of communication barriers, academic well-being, and a sense of belonging. This comprehensive view aligns with UNESCO's (2020) perspective, according to which inclusion involves ensuring presence, participation, and learning not merely formal access to the educational system.

Therefore, Broca's aphasia should not be understood solely from a clinical perspective but also in terms of its pedagogical implications. University faculty do not replace speech-language or medical intervention, but they can create conditions for accessible communication. This involves speaking clearly, providing written instructions, allowing students to prepare for tasks in advance, using multimodal resources, avoiding unnecessary pressure for immediate responses, valuing content over verbal fluency, and offering respectful feedback. These decisions are pedagogical, but also ethical, because they protect the student's right to demonstrate their learning without being penalized for their mode of communication.

Methodological Process and Main Findings of the Case Study

The study was conducted within the interpretive paradigm and using a qualitative approach, as it sought to gain an in-depth understanding of the relationship between teacher training, inclusive strategies, institutional support, and the academic trajectory of a student with Broca's aphasia. A single-case study design with an instrumental focus was adopted, appropriate for analyzing a complex educational phenomenon within its context and for producing analytical understanding rather than statistical generalization. The unit of analysis was the academic trajectory of a student enrolled in the Master's Program in Interdisciplinary Studies on Disability at the Bolivarian University of Ecuador. The approach to document analysis and source comparison was further supported by qualitative analysis criteria that recognize literature review as a systematic procedure for organizing, interpreting, and relating evidence from different sources (Casasempere-Satorres and Vercher-Ferrándiz, 2020).

The case was selected intentionally due to its explanatory value in understanding how teacher preparation can influence the inclusion of students with language- disabilities in higher education. Nine stakeholders directly involved in the training process participated: six tenured faculty members, two academic advisors, and one program coordinator. In addition, academic and institutional documents and records of non-participant classroom observation were analyzed. This triangulation allowed us to cross-check evidence from different sources and strengthen the credibility of the analysis.

The techniques used were a literature review, semi-structured interviews, and non-participant academic observation. The literature review included academic reports, evaluation records, tutoring records, and institutional documents on inclusion. The interviews provided insight into faculty perceptions regarding the training received, the strategies applied, and the challenges encountered. Academic observation allowed for the recording of patterns of participation, autonomy, use of supports, emotional engagement, and performance development. The analysis was conducted through thematic coding, combining initial theoretical categories with emerging categories derived from the data.

The criteria for rigor were based on the qualitative tradition proposed by Lincoln and Guba (1985). Credibility was strengthened through triangulation of sources and techniques; transferability was enhanced by a dense description of the context and the case; reliability was

ensured through the systematization of the procedure and the traceability of analytical decisions; and confirmability was supported by documentary evidence and consistency among data, categories, and interpretation. Observation was conceived as a pathway for professional development and a situated understanding of practices, consistent with experiences of interdisciplinary observation in higher education that highlight its value for reflecting on teaching (Miranda et al., 2021). From an ethical standpoint, the confidentiality of the student and participants was guaranteed, as were informed consent and the responsible handling of sensitive information related to disability status.

The results show that teacher training fostered a more confident, empathetic, and technically sound pedagogical response. The interviewed teachers noted that the prior training enabled them to understand the student's condition, anticipate accommodations, and design strategies without lowering their academic expectations. This is a central idea: inclusion did not mean lowering standards, but rather modifying the means of access, participation, and expression so that the student could demonstrate their competencies under conditions of equity.

Table 1. *Summary of the analyzed documents and their qualitative interpretation*

Document Type	Number	Key Findings	Qualitative interpretation
Academic reports	4	Progressive improvement in academic performance, participation, and the quality of assessed work.	Differentiated teaching strategies made it possible to demonstrate meaningful learning and foster continued progress in the curriculum.
Assessment Reports	3	Implementation of adjustments to assessment timelines, formats, and criteria.	Flexible assessment promoted educational equity without compromising the achievement of intended learning outcomes.
Tutoring Records	4	Systematic monitoring of academic performance, study organization, and social-emotional support.	Tutoring served as a key intervention strategy to strengthen student retention, autonomy, and academic success.
Institutional Documents	3	Existence of inclusion policies, support pathways, and reasonable accommodation procedures.	The institutional framework supported the implementation of inclusive teaching practices through coordinated and context-specific actions.

Note: Prepared by the author based on the document analysis conducted.

The document review showed a positive trend in the student's performance. In the early stages, difficulties were observed related to oral expression, classroom interaction, and confidence in communication. Subsequently, reports showed progress in conceptual understanding, academic work, participation with support, and completion of assignments. Assessment records reflected the application of reasonable accommodations, particularly regarding deadlines, alternative formats, and the use of adapted rubrics. These findings support the conclusion that the changes in assessment were not privileges but rather conditions of academic justice.

Semi-structured interviews confirmed the importance of faculty training. Participants emphasized that the training provided them with guidelines to act with greater confidence, avoid negative interpretations, and coordinate support with other departments. They also acknowledged ongoing challenges, such as the need for more specialized technological resources, more streamlined institutional protocols, and ongoing professional development opportunities. The

experience was valued as a process of professional transformation, as it shifted beliefs, raised awareness among faculty, and strengthened reflection on diversity in the university classroom.

Table 2. *Emerging Categories Derived from the Semistructured Interviews*

Emerging category	Evidence expressed by faculty members	Qualitative interpretation
Teacher training	Confidence to act, knowledge about disability, and willingness to adapt teaching-learning processes.	Prior training served as a facilitating factor for making informed, inclusive decisions.
Inclusive teaching strategies	Use of visual aids, information and communication technologies (ICT), adapted rubrics, flexible assessment, and collaborative work.	The practices implemented were aligned with the principles of Universal Design for Learning (UDL) and assessment equity.
Institutional challenges	Technological limitations, the need for specialized resources, and interdepartmental coordination.	Educational inclusion requires sustained institutional support that goes beyond the individual teacher's commitment.
Professional Transformation	Changes in pedagogical approach and greater sensitivity to student diversity.	The experience strengthened the teachers' ethical, reflective, and inclusive commitment.

Note: Prepared by the author based on nine semi-structured interviews conducted with teachers, tutors, and academic coordination staff.

Academic observation records showed a transition from initially limited participation to more active involvement in classes, debates, tutoring sessions, and group work. The observation revealed that autonomy did not emerge spontaneously but rather as a result of progressive support, teacher trust, technological mediation, and a respectful classroom environment. Similarly, it became evident that the emotional dimension was inseparable from academic performance: when students perceived understanding, time, respect, and real opportunities for expression, their motivation and confidence increased.

Table 3. *Results of Non-Participant Academic Observation*

Observed Dimension	Evidence recorded	Qualitative interpretation
Academic autonomy	Greater capacity for self-management through the use of technological aids and study organization strategies.	A progressive development of self-determination and academic autonomy was evident.
Participation	Gradual integration into discussions, collaborative activities, and tutoring sessions.	Inclusion extended beyond formal access to the program, fostering active participation in the educational process.
Compensatory Strategies	Use of specialized software, visual aids, and mechanisms for preparing for assignments in advance.	Technology served as a mediator in the process of communication, learning, and access to academic information.
Emotional engagement	Increased confidence, motivation, and willingness to participate in academic activities.	The inclusive environment contributed to emotional well-being and strengthened student retention.

Note: Prepared by the author based on seven non-participant academic observation records.

The integration of these three sources allowed for the construction of a relational explanatory model. Teacher training created the conditions for designing inclusive strategies; these strategies facilitated participation and the demonstration of learning; and institutional support ensured the continuity of the process. The impact on academic outcomes was neither linear nor attributable to a single factor. It resulted from a convergence of teacher knowledge, ethical attitude, pedagogical flexibility, accessible assessment, and an institutional support network.

In summary, the study confirms that teacher training in inclusion is a necessary, though not sufficient, condition for improving the academic outcomes of students with disabilities. It is necessary because it guides pedagogical decision-making; but it is not sufficient unless accompanied by institutional policies, resources, a culture of accessibility, and collaborative work. This conclusion is particularly important for universities that aspire to consolidate sustainable models of inclusion that do not depend on isolated individual efforts.

Universal Design for Learning and Inclusive Assessment: From Accommodations to Anticipatory Planning

One of the key lessons from this case is that inclusion is strengthened when the pedagogical response stops relying exclusively on retroactive adjustments and begins to be planned from the outset to accommodate student diversity. Universal Design for Learning (UDL) offers a particularly relevant framework for this transition. The review by Rao et al. (2014) shows that universal design models seek to broaden access to the curriculum through diverse options for representation, participation, and expression. In higher education, this approach makes it possible to anticipate barriers and design experiences that do not require students to continually request exceptions to demonstrate what they know.

When applied to Broca's aphasia, UDL involves presenting information through combinations of text, diagrams, visual aids, and audiovisual resources; offering alternatives for participation that do not rely exclusively on immediate oral responses; and allowing students to demonstrate their learning through products that are equivalent in difficulty but different in format. Anticipating questions, using graphic organizers, providing transparent rubrics, allowing extra time when communication demands warrant it, and incorporating asynchronous modalities can all be integrated into routine planning. In this way, reasonable accommodation ceases to be viewed as a concession and is instead understood as a pedagogical decision aimed at ensuring equitable access to the same learning outcomes.

The evidence from this case demonstrates a convergence between the practices implemented and this design logic. Visual aids, alternative assessment methods, and methodological flexibility did not benefit only the student with aphasia; they also made the instructions more explicit, clarified the assessment criteria, and diversified opportunities for participation. Therefore, the DUA should be understood as a preventive accessibility strategy that reduces the need for belated corrections, although it does not eliminate the obligation to make individualized accommodations when a person's characteristics so require.

Inclusive assessment is an integral component of this approach. Its purpose is not to lower standards or arbitrarily modify objectives, but rather to prevent a response format from becoming a barrier unrelated to the competency being assessed. If the learning outcome relates to critical analysis, conceptual mastery, or problem-solving, immediate verbal fluency should not become an implicit criterion for success when it is not part of the competency itself. This

distinction allows us to maintain academic rigor while simultaneously ensuring evaluative fairness.

Timely Support for Students and Institutional Shared Responsibility

The experience analyzed also demonstrates that inclusion cannot be limited to classroom time. It requires continuous support that connects teaching, tutoring, academic coordination, and institutional services. Early identification of needs helps prevent minor difficulties from turning into academic lag, demotivation, or the risk of dropping out. In this sense, timely support does not mean overprotecting the student, but rather ensuring that they have access to information, communication channels, and appropriate support to exercise their autonomy.

This support should be organized as an institutional pathway. In the first phase, communication barriers and preferences are identified with the student's participation. In the second phase, pedagogical and assessment supports are agreed upon with the teachers involved. Subsequently, progress is monitored through academic evidence and tutoring sessions, adjusting measures when they cease to be effective. Finally, institutional lessons learned are documented so that the response does not depend on the memory or initiative of a single person. This approach transforms inclusion into an organizational capacity.

Observation and collaborative work among teachers can contribute to this capacity. Miranda et al. (2021) note that interdisciplinary observation fosters professional reflection and peer learning. Complementarily, Suryobroto et al. (2022) demonstrate, based on teachers' experiences in inclusive contexts, that daily practice requires adjustments, reflection, and context-specific responses to diversity. Although the contexts of both studies differ from the case presented here, their contributions converge on one idea: inclusive competence develops when teachers have systematic opportunities to analyze their practice and develop responses together with other professionals.

Institutional support also safeguards the emotional dimension of the student's academic journey. For students with language disabilities, repeated exposure to high-pressure communication situations can increase anxiety, frustration, or withdrawal. An environment that anticipates support needs, respects response times, and offers private and constructive feedback fosters the confidence to participate. Monitoring, therefore, must simultaneously address performance, participation, autonomy, and academic well-being, without medicalizing the college experience or reducing the student to their diagnosis.

Digital Accessibility, Assistive Technologies, and Responsible Artificial Intelligence: An Emerging Area for Inclusion

An additional contribution of this chapter is the incorporation of an emerging trend that was not sufficiently developed in the original paper: the role of digital accessibility, assistive technologies, and responsible artificial intelligence in supporting students with language disabilities. This update is relevant because higher education is increasingly characterized by virtual environments, learning platforms, multimedia resources, digital assessments, and assisted communication tools. For students with Broca's aphasia, these technologies can expand their possibilities for expression, organization, and participation, provided they are used in accordance with pedagogical, ethical, and accessibility standards.

Assistive technologies should not be viewed as isolated or merely instrumental solutions. Their value depends on how they are integrated into the curriculum, assessment, and teacher-student interaction. Relevant supports for students with expressive difficulties include word processors with text prediction, augmentative and alternative communication (AAC) applications, graphic organizers, class recordings, captions, screen readers, speech-to-text conversion, image banks, visual rubrics, academic writing templates, and platforms that allow for asynchronous responses. Zárate-Rueda et al. (2025) note that technological tools and inclusive pedagogy in higher education must be analyzed in a coordinated manner, because technology is only inclusive when it addresses real needs and reduces barriers to participation.

Digital accessibility means that virtual materials and environments can be used by people with diverse abilities. In the case of language disabilities, this involves providing clear instructions, avoiding text overload, including visual aids, allowing for multiple delivery formats, using understandable language, providing extended time, ensuring that videos have captions, and ensuring that platforms allow for written, oral, visual, or multimodal interaction. These measures do not benefit only students with disabilities; they enhance the learning experience for the entire group, in accordance with the principles of Universal Design for Learning.

Accessibility must be integrated with inclusive pedagogy and teacher training. Cotán et al. (2024) note that inclusive methodological strategies in higher education require diversifying resources, procedures, and opportunities for participation; this diversification takes on special importance in virtual environments, where a technically available platform may still be pedagogically inaccessible. Similarly, Dyliaeva et al. (2024) caution that institutional policies lose their effectiveness when they are not accompanied by teacher training and concrete support. Therefore, digital accessibility must be viewed as a professional and institutional competency, not as the exclusive responsibility of technology specialists.

Generative artificial intelligence presents both opportunities and risks. Among the opportunities are support for idea planning, text reformulation, converting drafts into academic structures, generating outlines, practicing responses, synthesizing content, and creating visual aids. For a student with Broca's aphasia, these tools can serve as mediators of expression, provided they do not replace the student's own thinking or foster uncritical dependence. Their use should be geared toward promoting autonomy, clarity of communication, and access to the curriculum.

However, the use of artificial intelligence requires institutional ethics. Criteria must be established regarding transparency, data protection, respect for authorship, information verification, prevention of bias, and teacher support. Under no circumstances should artificial intelligence become a mechanism for surveillance, stigmatization, or automatic assessment of students with disabilities. On the contrary, it should be integrated as a reasonable accommodation and complementary resource within a clear academic policy. Teacher training, therefore, must incorporate inclusive digital literacy and the responsible use of emerging technologies.

This subchapter reinforces a central idea: university inclusion both now and in the future requires faculty members capable of integrating pedagogy, accessibility, and technology. It is not enough to simply be aware of a student's circumstances; it is necessary to design learning ecosystems that allow for multiple forms of representation, action, expression, and engagement. In the case studied, the use of assistive technologies contributed to the development of compensatory strategies, autonomy, and participation. Moving forward, universities must strengthen teacher training programs that include digital accessibility, augmentative communication tools, and ethical guidelines for artificial intelligence in educational contexts.

Table 4. *Proposal for the Integration of Assistive Technologies for Students with Language Disabilities*

Identified Need	Technological or pedagogical support	Criteria for Inclusive Use
Difficulties with spontaneous oral expression	Written responses, pre-recorded messages, visual aids, and augmentative and alternative communication systems.	Evaluate academic content and demonstrated learning without penalizing verbal fluency.
Organizing complex ideas	Concept maps, graphic organizers, and templates for structuring texts.	Facilitate the cognitive organization of information prior to oral or written production.
Communication-Related Anxiety	Asynchronous participation, anticipating questions, and personalized tutoring.	Reducing communication pressure by promoting equitable participation in academic processes.
Written work requiring greater effort	Text prediction tools, assisted editing, and technological aids for writing.	Promote written expression without replacing the student's authorship or reasoning.
Access to academic instructions and content	Multimodal materials, captions, explicit rubrics, and accessible language.	Ensure understanding of assignments, assessment criteria, and learning expectations.

Note: Prepared in-house based on the principles of educational accessibility, assistive technologies, and Universal Design for Learning (UDL).

Integrated Argumentation: From Individual Training to an Inclusive Institutional Culture

The study's findings allow for an integrated discussion without reducing it to a conventional section of an article. The first premise is that teacher training influences academic outcomes because it transforms the way teachers interpret disability. When disability is interpreted from a deficit perspective, responses tend to focus on limitations, exceptions, or lowered expectations. When interpreted from a rights- and accessibility-based approach, responses are geared toward modifying teaching and assessment conditions. In the case studied, this second perspective made it possible to create real learning opportunities.

This finding aligns with the literature that frames inclusion as a transformation of cultures, policies, and practices. Echeita Sarrionandia and Duk Homad (2008) argue that inclusion must be analyzed in terms of the barriers that restrict participation and learning, while Bartolo et al. (2025) emphasize the need to combine equitable systems with individualized supports. In the case study, teacher training served precisely as a bridge between these two levels: it strengthened general accessibility criteria and, at the same time, enabled decisions tailored to the student's communicative profile.

The professional transformation observed is also consistent with the evidence on inclusive training and attitudes. Sharma and Sokal (2015) show that teacher education can influence beliefs about inclusion, and Rao et al. (2014) provide a framework for understanding why anticipatory design reduces barriers. These references help explain that the training did not merely increase

knowledge: it altered the pedagogical understanding of disability and expanded the range of available options for teaching and assessment.

The second premise is that inclusive strategies are effective when they are intentional, sustained, and contextualized. It is not enough to apply a general list of accommodations; decisions must be tailored to the student's profile, the nature of the course, the learning outcomes, and the assessment criteria. This interpretation aligns with Cotán et al. (2024), who highlight methodological diversification as a prerequisite for reducing barriers in higher education, and with Zárate-Rueda et al. (2025), whose review underscores the value of integrating technology with inclusive pedagogy. In the case analyzed, flexibility in timing, formats, and support did not imply lower standards, but rather greater fairness in the conditions for demonstrating knowledge. The finding therefore provides contextual evidence on how accessibility can uphold academic rigor rather than undermine it.

The third premise is that institutional support transforms best practices into sustainable processes. An individual faculty member may make valuable adaptations, but their impact will be limited without a structure that supports decision-making, provides resources, guides protocols, and supports students. Dyliaeva et al. (2024) show that, even in institutions with stated inclusive policies, challenges persist regarding faculty training, accessibility, and the coordination of support services. The results of this study align with this evidence and help clarify that the coordination between teaching, tutoring, academic advising, and campus well-being can act as a protective mechanism for student retention. Inclusion in higher education must therefore be understood as a shared responsibility and not as the sole task of the classroom instructor.

The fourth premise is that academic outcomes must be interpreted from a broad perspective. Students not only showed improvement in the assessed outcomes but also made progress in participation, autonomy, confidence, use of support services, and retention. This interpretation is consistent with UNESCO's (2020) approach, which links inclusion to attendance, participation, and learning, and broadens the traditional notion of performance focused exclusively on grades. In this case, the convergence of academic, communicative, and socio-emotional indicators shows that inclusive success depends on the relationship between the student's abilities and the conditions the institution creates for the student to express them. The university, therefore, must not only certify knowledge but also guarantee real opportunities to learn, participate, and develop the educational project.

Finally, the study contributes to educational science by bringing attention to a disability that is rarely addressed in the university setting and by demonstrating, through a unique case, how faculty training can influence a specific student's academic trajectory. Its value lies not in statistically generalizing the findings, but in offering an analytical understanding that can be applied to contexts with similar characteristics. The evidence from this case suggests that training is most effective when integrated with Universal Design for Learning, flexible assessment, assistive technologies, and institutional coordination. At the same time, the unique nature of the case constitutes a limitation that calls for further research involving multiple cases, institutions, and disability profiles. This limitation reinforces the need for interpretive caution and positions the chapter's contribution as contextual evidence to guide decisions and new lines of research.

Conclusions

This chapter leads to the conclusion that teacher training in inclusion is a determining factor in transforming the learning conditions for students with disabilities in higher education. In the case analyzed, the faculty's prior training enabled them to understand Broca's aphasia as a

communicative condition requiring specific pedagogical accommodations rather than as an intellectual limitation or an inability to pursue graduate studies. This understanding was decisive in preventing unfair interpretations of the student's performance and in developing educational responses based on equity, accessibility, and respect.

The influence of teacher training was evident in the implementation of inclusive pedagogical strategies. The use of visual aids, assistive technologies, adapted rubrics, flexible time frames, tutoring, and alternative modes of participation enabled the student to demonstrate their learning through methods tailored to their communication needs. These strategies did not lower academic standards; on the contrary, they allowed for a more accurate assessment of the knowledge, skills, and competencies achieved. Therefore, inclusive assessment must be understood as a practice of academic justice that recognizes different forms of expression of learning.

Institutional support was another key element. Coordination among faculty, tutors, academic leadership, and university wellness services supported the student's academic journey and ensured that inclusion did not depend solely on individual efforts. This collaboration confirms that university inclusion requires support systems, clear protocols, an accessible institutional culture, and the commitment of the entire academic community. When the institution supports both faculty and students, reasonable accommodations cease to be exceptional measures and become legitimate educational practices.

The study also supports the conclusion that inclusive academic outcomes must be understood holistically. The gradual improvement in grades was significant, but it was not the only indicator of progress. Greater autonomy, active participation, the use of compensatory strategies, confidence in communication, retention, and academic well-being were also relevant. These elements show that inclusion is not measured solely by passing courses, but by the real opportunity to participate, learn, and develop fully in university life.

As an updated contribution, the chapter highlights the need to incorporate digital accessibility, assistive technologies, and responsible artificial intelligence into teacher training programs. Digital tools can enhance communication, the organization of ideas, and academic expression for students with language disabilities; however, their use must be guided by ethical, pedagogical, and data protection principles. Technology does not replace the teacher nor does it single-handedly resolve institutional barriers, but it can become a powerful mediator when integrated into inclusive planning.

Looking ahead, it is recommended that institutions of higher education strengthen ongoing teacher training programs on inclusion, flexible assessment, Universal Design for Learning, digital accessibility, and support for less visible disabilities. It is also suggested that institutions create support pathways that integrate teaching, tutoring, student well-being, and specialized services. The experience presented here demonstrates that inclusion is not an abstract ideal, but a practical reality when training, commitment, and organization are in place. Consequently, this chapter contributes to scientific and pedagogical reflection on how universities can move toward more humane, accessible, and equitable models.

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Women's Entrepreneurship as an Economic and Social Right in Ecuador

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Introduction

Women's entrepreneurship has taken on growing significance in contemporary legal, economic, and social discourse, particularly in Latin America a region characterized by deep-seated structural gender inequalities that directly impact women's access to meaningful economic opportunities. In Ecuador, women's entrepreneurship not only represents an alternative to exclusion from the formal labor market but has historically served as a strategy for economic survival, personal autonomy, and social participation, particularly for women living in poverty, rural women, indigenous women, and female heads of household. This reality constitutes a complex phenomenon that transcends the mere economic dimension and extends into the realm of fundamental rights and social justice.

Empirical evidence from international organizations reveals that women start businesses under substantially more precarious conditions than men, facing systematic barriers in accessing financing, training, social protection, and formal markets (ECLAC, 2023). This situation is neither a market accident nor a natural consequence of economic dynamics, but rather the result of legal, institutional, and cultural structures that reproduce and perpetuate gender inequality in the economic sphere. This finding highlights that women's entrepreneurship cannot be analyzed solely through the lens of market logic or productivity; rather, it requires a legal approach centered on economic and social rights and on the principle of material equality understood not as mere formal equality before the law, but as substantive equality that demands the removal of structural obstacles and the adoption of positive measures to achieve parity.

Under the social constitutionalism adopted by Ecuador in the 2008 Constitution (Constitution of the Republic of Ecuador, 2008), economic, social, and cultural rights become justiciable and enforceable, which necessitates rethinking women's entrepreneurship as a concrete manifestation of the right to work, to equality, to development, and to a dignified life. This constitutional shift, which is part of the tradition of Latin American neoconstitutionalism and the constitutional state of rights and justice (Manosalvas, 2014), implies the recognition that social rights are not mere programmatic aspirations or rhetorical declarations, but rather genuine subjective rights that give rise to concrete legal and y obligations for the State and that can be enforced before the courts (Arrubia, 2018; Martínez Martínez, 2017).

In this constitutional context, women's entrepreneurship is established as an economic and social right whose guarantee imposes positive obligations on the State both to respect and to protect and fulfill it. However, the Constitution's own economic model which establishes property within the realm of the popular and solidarity-based economy as the essential pillar of the economy could, in the name of its evolution, establish entrepreneurship and especially entrepreneurship

by a specific group, such as women as an autonomous human right. This possibility is grounded in the open and progressive nature of the catalog of fundamental rights, which is not static but rather evolves with social change (Espinosa Aguilar, 2022; Mesa León, 2023), as a means of legally enshrining the requirements of women's entrepreneurship as a constitutionally protected institution.

Central Issue: The Gap Between Formal Recognition and Effective Guarantee

Despite the constitutional recognition of substantive equality and economic and social rights, women entrepreneurs in Ecuador face persistent legal, institutional, economic, and cultural barriers that hinder the full exercise of their rights. Among the main difficulties are limited access to credit and financial services, the structural informality of entrepreneurial ventures, the absence of adequate social protection systems for self-employment, the burden of unpaid domestic and care work which constitutes a form of invisible subsidy to the formal economy (Molina Barzola et al., 2026), as well as economic regulations that do not mainstream a gender perspective or address the specific characteristics of women's career paths.

These conditions create a significant gap between the formal recognition of entrepreneurship as a lawful activity and its effective protection as an economic and social right. The central question of this research revolves precisely around this tension: it is imperative to determine to what extent Ecuador's current constitutional, regulatory, and public policy framework effectively guarantees women's entrepreneurship as an enforceable right, and what structural, regulatory, and institutional obstacles prevent its full realization. This question is not merely descriptive but also has a prescriptive and transformative dimension, as it seeks to identify gaps in protection and propose legal avenues for overcoming them.

The legal justification for this research lies in the need to analyze women's entrepreneurship from a rights-based perspective, moving beyond welfare-oriented or purely economic approaches that reduce women entrepreneurs to passive beneficiaries of public policies or to economic agents lacking legal standing. Recognizing women's entrepreneurship as an economic and social right implies acknowledging its enforceability, the application of the principle of progressivity which prevents a rollback of the levels of protection achieved and the prohibition of regression in the area of social rights, principles that have been developed both by constitutional doctrine (Arrubia, 2018; Martínez Martínez, 2017) and by international human rights protection systems.

From a social perspective, strengthening women's entrepreneurship is a key element in poverty reduction, the economic inclusion of historically excluded groups, and sustainable development with a gender focus. Women entrepreneurs not only generate income for their households but also contribute to the revitalization of local economies, the creation of networks of solidarity and mutual support, and the transformation of cultural patterns that perpetuate women's subordination. Furthermore, this analysis is relevant in light of the international commitments made by Ecuador regarding gender equality and human rights, particularly those arising from the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW, 1979) and the recommendations of UN Women (2019), which urge States to adopt concrete measures to guarantee women's economic autonomy.

The central purpose guiding this research is to analyze women's entrepreneurship as an economic and social right in Ecuador, based on the current constitutional, regulatory, and international framework, with the aim of identifying both the potential and the limitations of the current legal system in effectively guaranteeing this right. This analysis unfolds across several complementary levels that allow for a comprehensive understanding of the phenomenon. First, the study seeks to develop a conceptual and theoretical framework for women's

entrepreneurship with a gender perspective, which allows for an understanding of the specific characteristics of women's entrepreneurial experience and the ways in which gender operates as a structuring category of economic opportunities and constraints. Second, it is necessary to examine the relationship between women's entrepreneurship and economic and social rights, establishing the doctrinal and normative links that provide the basis for recognizing it as an enforceable right.

Third, the study proposes to analyze the constitutional and regulatory basis for women's entrepreneurship in Ecuador, identifying the constitutional, legal, and regulatory provisions that recognize, regulate, or affect it, as well as relevant judicial interpretations. Fourth, the study seeks to identify the main legal and structural barriers faced by women entrepreneurs in Ecuador, including those stemming from regulatory deficiencies as well as those resulting from discriminatory institutional practices or the absence of adequate public policies. Finally, based on this comprehensive analysis, the aim is to propose legal, institutional, and public policy guidelines for strengthening women's entrepreneurship as an enforceable right, which can guide both government action and social and legal mobilization in favor of economic gender equality.

This chapter contributes to the field of legal studies on economic and social rights, gender, and constitutionalism by proposing a doctrinal foundation for women's entrepreneurship as an autonomous right or, at the very least, as a specific dimension of already recognized fundamental rights. The originality of this work lies in the articulation of three analytical perspectives that are often developed separately: the theory of fundamental rights, gender and legal studies, and public policy analysis. This integration makes it possible to move beyond both purely formalist views of law which ignore the material conditions under which rights are exercised and exclusively sociological or economic approaches which neglect the normative dimension and the transformative potential of law.

The analysis presented in this chapter anticipates several fundamental conclusions that will be explored in depth throughout the study. First, it argues that the Ecuadorian constitutional framework provides a solid foundation for recognizing women's entrepreneurship as an economic and social right, but that this potential has not yet translated into sufficient legislative and jurisprudential development. Second, it is evident that the main barriers to the effective exercise of this right are not solely economic in nature, but are deeply rooted in legal and institutional structures that perpetuate gender inequality. Third, it is argued that overcoming these barriers requires not only specific regulatory reforms but also a comprehensive transformation of the approach by which the State and the law address women's entrepreneurship, shifting from a welfare-based logic to a rights-based logic.

Finally, it is argued that strengthening women's entrepreneurship as an enforceable right not only benefits women entrepreneurs but also constitutes a necessary condition for the realization of the constitutional project of substantive equality and for the construction of a more just, inclusive, and sustainable economy. In this sense, women's entrepreneurship emerges not as a sectoral or marginal issue, but as a central axis for rethinking the relationship between law, the economy, and gender in contemporary constitutionalism.

Conceptual Framework of Women's Entrepreneurship as an Economic Activity.

The conceptual framework for women's entrepreneurship allows for a more precise definition of its legal, economic, and social nature, as well as its direct link to economic and social rights,

substantive equality, and human development. From a socio-legal perspective, this framework does not merely define entrepreneurship as a productive activity but analyzes it as an expression of the exercise of fundamental rights in contexts marked by structural gender inequalities. Consequently, women's entrepreneurship must be understood as a complex category, shaped by normative, economic, cultural, and political factors that influence both its configuration and its sustainability.

To begin with, we must define entrepreneurship, which, in general terms, is the process by which one or more people identify economic opportunities and organize resources to create goods or services, taking on risks with the aim of generating economic and social value (Schumpeter, 1934). From a contemporary perspective, this concept has moved beyond its strictly commercial focus to incorporate social, community, and solidarity-based dimensions, especially in economies with high levels of informality and labor exclusion.

From a legal perspective, entrepreneurship is linked to the freedom of economic initiative, the right to work in its various forms, and the right to development. Within the framework of economic and social rights, entrepreneurship constitutes an activity protected by the State as a legitimate means of generating income, achieving personal fulfillment, and contributing to collective well-being (Sen, 1999).

From this perspective, women's entrepreneurship constitutes a specific category within the general concept of entrepreneurship, characterized by being led, managed, and sustained by women in contexts historically marked by structural gender inequalities. It can be defined as the set of economic initiatives developed by women, individually or collectively, aimed at generating income, achieving economic self-sufficiency, and actively participating in economic life, in both the formal and informal sectors (UN Women, 2019).

This concept encompasses not only the creation of formal businesses but also self-employment, microenterprises, the popular and solidarity economy, and community- and association-based enterprises modalities that are particularly relevant in countries such as , and Ecuador, where large segments of women find in these productive activities a means of subsistence and economic autonomy (ECLAC, 2023).

From a human rights perspective, women's entrepreneurship should not be viewed as a residual strategy in the face of exclusion from wage employment, but rather as a legitimate expression of women's right to participate on an equal footing in the country's economic and productive life. This conception moves beyond welfare-based approaches and recognizes women as subjects of rights and development.

Women's entrepreneurship, understood as an economic activity, is grounded in a series of fundamental principles, some of which are of a legal nature. The principle of substantive equality requires the State to adopt differentiated measures to correct structural inequalities affecting women in the economic sphere. This principle is complemented by the prohibition of discrimination on the basis of gender, enshrined in both constitutional law and international human rights instruments (Facio, 2009).

Likewise, the principle of human dignity constitutes the central pillar of women's entrepreneurship, insofar as it recognizes women's genuine ability to pursue an autonomous life path. Added to this is the principle of economic autonomy understood as the effective capacity to generate and manage one's own resources and the principles of progressivity and non-regressivity of economic and social rights, which oblige the State to constantly expand the conditions for the effective exercise of women's entrepreneurship (Manosalvas, 2014).

Consequently, it is linked to a set of related rights that constitute its essential content. Among these are the right to work in its various forms, the right to equality and non-discrimination, the right to social security, the right to access credit and financial services, the right to education and training, and the right to a dignified life.

Human rights doctrine has emphasized the interdependence and indivisibility of fundamental rights, such that the violation of any one of these rights directly impacts the viability and sustainability of women-led entrepreneurial ventures. In this regard, women's entrepreneurship cannot be guaranteed in isolation but rather through comprehensive public policies that simultaneously address the multiple dimensions of economic exclusion (Martínez Martínez, 2017).

From this perspective, economic autonomy constitutes one of the fundamental pillars of women's empowerment and the effective exercise of their human rights. According to ECLAC (2021), the ability to generate one's own income allows women to expand their scope for decision-making, reduce economic dependence, and better cope with situations of violence, exclusion, and structural precariousness.

In this context, women's entrepreneurship emerges as a significant pathway to exercising the right to a dignified life, as it contributes to economic self-sufficiency, the strengthening of economic citizenship, and women's active participation in economic decision-making, in both the private and public spheres (Sen, 1999).

Finally, when evaluating public policies and the legal and material conditions that enable women's entrepreneurship, it must be taken into account that there are various social areas that simultaneously function as both causes and consequences of its development. Among these are education, access to financial services, the social organization of care, political participation, and access to economic justice. The unequal distribution of un domestic work and unpaid care work constitutes one of the main barriers to women's entrepreneurship, as it limits the time, resources, and energy available for engaging in productive activities (ECLAC, 2021).

In turn, strengthening women's entrepreneurship can have positive effects in these same areas, helping to improve access to education, health care, housing, and social protection which highlights the two-way nature of the relationship between entrepreneurship and social rights.

As an economic activity, the subject of women's entrepreneurship is women considered individually or collectively in their capacity as holders of economic and social rights. The object of women's entrepreneurship is lawful economic activity aimed at generating income, goods, or services under conditions of dignity, equality, and sustainability.

Among its main characteristics are the diversity of organizational forms, the prevalence of micro and small enterprises, its integration with the popular and solidarity economy, and its frequent coexistence with unpaid caregiving responsibilities. The substance of women's entrepreneurship, as a protected economic activity, encompasses effective access to productive resources, financing, training, social protection, legal certainty, and market participation elements that are indispensable for its full exercise.

An analysis of women's entrepreneurship as an economic and social right requires a preliminary theoretical definition of the concept of human rights, their structure, principles, and forms of constitutional recognition. Human rights do not constitute a homogeneous or static legal category, but rather the result of a historical, philosophical, and normative process that has evolved in response to social, political, and economic transformations. In this sense,

understanding them requires an interdisciplinary approach that integrates political philosophy, legal theory, and contemporary constitutionalism.

Theoretical and Philosophical Foundations of Human Rights and the Constitutionalization of Economic Activities: Their Context in Ecuador

Since the days of classical natural law, human rights have been conceived as prerogatives inherent to human nature, prior to and superior to the State, grounded in the intrinsic dignity of the person. Authors such as John Salguero Salguero have argued that rights such as life, liberty, and property exist independently of state recognition, and that the positive legal order must limit itself to guaranteeing and protecting them against the arbitrariness of power (Salguero Salguero, 2016). This conception had a decisive influence on the early declarations of rights and on the idea that certain spheres of human life including the economic activities necessary for subsistence enjoy enhanced legal protection.

Subsequently, rationalist natural law theory, represented by authors such as Grotius and Pufendorf, reinforced the idea of universal rights based on reason, progressively dissociating them from theological foundations and consolidating their claim to universal validity (Lucas, 2009). This school of thought laid the groundwork for the modern conception of human rights as ethical and legal limits on state power.

In contrast, legal positivism conceives of human rights as creations of the legal system, whose existence and enforceability depend on their express recognition in valid legal norms. From this perspective, systematically developed by Hans Haba, rights do not exist outside the normative system, and their protection is contingent upon the formal procedures of law-making (Haba, 1996). Under this approach, economic and social rights were historically considered programmatic norms, lacking direct enforceability.

However, the limitations of strict positivism in guaranteeing the effective protection of human rights especially in contexts of structural inequality led to the emergence of contemporary schools of thought such as post-positivist constitutionalism and neoconstitutionalism. These schools transcend the dichotomy between natural law and positivism by recognizing that human rights are grounded both in human dignity and in their constitutional codification. Within this framework, rights acquire direct normative force, are justiciable, and function as substantive limits on public power and as optimization mandates that guide state action (Espinosa Aguilar, 2022; Manosalvas, 2014; Chacín Fuenmayor and Finol Romero, 2022).

Concept of Human Rights and Catalog of Rights

Human rights can be defined as those powers, prerogatives, and guarantees inherent to all persons by the mere fact of being human, aimed at ensuring material and spiritual conditions compatible with human dignity, freedom, and substantive equality. This conception has been widely adopted by both constitutional doctrine and international human rights law (Hierro Sánchez Pescador, 2011; Mesa León, 2023).

From a functional perspective, human rights serve a dual purpose: on the one hand, they act as limits on state power; on the other, they impose positive duties of protection, promotion, and guarantee, which are particularly relevant in the realm of economic and social rights (Arrubia, 2018). This dual dimension is key to understanding women's entrepreneurship not only as an economic freedom but also as a right that requires structural conditions for its effective exercise.

With regard to the catalog of rights, legal doctrine distinguishes between a numerus clausus model in which rights are limited to those expressly recognized in the constitutional text and an open catalog model (catalogus apertus), which allows for the recognition of new rights derived from human dignity, historical development, and social transformations. Authors such as Lucas (2009) and Hierro Sánchez Pescador (2011) emphasize that the expansive nature of human rights is one of their essential characteristics.

Structure of Human Rights: Subject, Object, and Content

From an analytical and dogmatic perspective, human rights have a structure composed of three essential elements: subject, object, and content. The subject of the right is the person or collective that holds it, without any discrimination, which includes both individuals and groups that have historically been excluded or are in a situation of vulnerability. In contemporary constitutionalism, the collective ownership of certain rights is also recognized, especially in contexts of legal and social pluralism (Mesa León, 2023).

The object of the right refers to the protected legal interest, which may consist of freedoms, entitlements, material conditions, or social relationships necessary for a dignified life. In the realm of economic and social rights, the object is often linked to structural conditions such as access to work, the means of production, credit, and equitable economic opportunities (Arrubia, 2018).

For its part, the content of a right encompasses the set of powers, entitlements, obligations, and guarantees that enable its effective exercise. Espinosa Aguilar (2022) argues that the content of fundamental rights is expressed in principles that impose mandates of optimization, which implies that their realization may be gradual but can never be arbitrarily denied.

In the case of economic and social rights, this structure takes on particular relevance, since their content includes both negative obligations of abstention avoiding undue interference and positive obligations of action on the part of the State, such as the adoption of public policies, affirmative action, and specific regulatory frameworks. This reinforces their enforceable and justiciable nature, refuting the notion that they are merely programmatic objectives (Martínez Martínez, 2017; Campos Mello, 2019).

In this regard, the constitutionalization of human rights is grounded in a series of structural principles that guide their interpretation, application, and normative development. Among the most relevant are the principle of human dignity, understood as a founding value of the constitutional order; the principle of substantive equality, which legitimizes the adoption of differentiated measures to correct structural inequalities; and the principle of the interdependence and indivisibility of rights, which prevents rigid hierarchies among civil, political, economic, and social rights (Mesa León, 2023; Hierro Sánchez Pescador, 2011).

Likewise, the principle of progressiveness and non-regressiveness imposes on the State the obligation to make steady progress in the realization of human rights and to refrain from adopting measures that entail unjustified setbacks. This principle is particularly relevant in the area of economic and social rights, as it makes economic and budgetary policy contingent upon the protection of fundamental rights (Arrubia, 2018).

Finally, the pro persona principle constitutes a central hermeneutic criterion of contemporary constitutionalism, as it requires that legal norms be interpreted and applied in the manner most favorable to the individual and to the full exercise of their rights. In the Ecuadorian context, these principles acquire constitutional status and serve as binding parameters for the interpretation and application of rights, allowing for the constitutionalization of economic activities when they

function as means to guarantee dignity, equality, and good living, as is the case with women's entrepreneurship (Manosalvas, 2014; Mesa León, 2023).

The Constitutionalization of Economic Activities

The constitutionalization of an economic activity occurs when it transcends its purely private or commercial nature and is directly linked to the realization of fundamental rights and the essential purposes of the State. According to Azpitarte-Sánchez (2016), the Constitution should be understood as an "open order of values," which allows for the integration of relevant social and economic practices within the scope of constitutional protection. Thus, activities such as work, entrepreneurship, the popular and solidarity-based economy, or community- y production can acquire constitutional status when they contribute to human development and the dignity of individuals.

In legal terms, an economic activity is constitutionalized when at least the following elements are present:

A connection to human dignity, as a means of subsistence, autonomy, and personal self-realization (Espinosa Aguilar, 2022).

A direct relationship with fundamental rights, such as the right to work, to material equality, to development, and to non-discrimination (Ruiz Miguel, 2008).

Express or implicit legal recognition, derived from an open catalog of rights, which allows for the incorporation of new rights or dimensions not exhaustively enumerated (Hierro Sánchez Pescador, 2011).

State obligations to respect, protect, and guarantee these rights, which can be translated into public policies, affirmative actions, and specific regulatory frameworks (Martínez Martínez, 2017).

In the case of Ecuador, the 2008 Constitution explicitly adopts an open catalog of rights, which enables the recognition of implicit rights derived from human dignity and the principle of good living (sumak kawsay). Manosalvas (2014) argues that this constitutional model allows for the constitutional recognition of economic practices that have historically been rendered invisible, especially those carried out by women, communities, and the working classes, provided they contribute to the realization of rights and material equality. Therefore, it can be said that today, in Latin America and Ecuador, there is a fully established right to entrepreneurship, with special mention given to women.

Women's Entrepreneurship as a Human Right: Application to Ecuador.

Analysis Based on International Human Rights Standards

CEDAW is the primary international instrument on women's rights. It establishes the obligation of States Parties to eliminate discrimination in economic and social life by guaranteeing women's access to economic resources, credit, and productive activities (CEDAW, 1979).

For its part, the 2030 Agenda recognizes women's economic empowerment as a cross-cutting pillar of sustainable development, particularly through Sustainable Development Goals 5 and 8.

By ratifying international human rights instruments, Ecuador assumes binding legal obligations that must be reflected in its legislation and public policies, in accordance with the principle of conventionality, as set forth in the 2008 Constitution. Since the Ecuadorian Constitution

recognizes the direct applicability of international human rights treaties, this strengthens the enforceability of women's entrepreneurship as an economic and social right.

Likewise, the 2008 Constitution enshrines substantive equality and the state's obligation to adopt affirmative action measures in favor of historically discriminated-against groups, including women.

In addition, the 2008 Constitution of the Republic of Ecuador clearly adopts an open-catalog model by recognizing rights not expressly enumerated, by directly incorporating international human rights treaties, and by establishing the principle of progressivity. This constitutional framework allows for the integration of new manifestations of rights, such as women's entrepreneurship, when these serve as means for the realization of dignity, substantive equality, and good living (Constitution of the Republic of Ecuador, 2008; Manosalvas, 2014).

The Constitutional Court of Ecuador has recognized the obligation to exercise conventionality review, which entails interpreting and applying domestic law in accordance with the international human rights treaties ratified by the State (Constitutional Court of Ecuador, Ruling No. 1149-19-JP/21). Consequently, women's entrepreneurship must be protected under the Constitution and international standards, thereby closing the constitutional–international circle of protection for women's rights.

Women's Entrepreneurship as a Right: Subject, Object, Content, Principles, and Related Rights in the Ecuadorian Constitution

The recognition of women's entrepreneurship as an economic and social right requires a doctrinal approach that identifies its structural elements and its normative foundation in the 2008 Constitution of the Republic of Ecuador, in addition to establishing it as a complex set of rights. From the perspective of contemporary constitutionalism, economic activities are neither neutral nor merely private; rather, they can acquire constitutional significance when they serve as means for the realization of human dignity, substantive equality, and good living, especially in contexts of structural gender inequality (Manosalvas, 2014).

Within this framework, women's entrepreneurship transcends the notion of a simple economic initiative to become a concrete expression of economic and social rights, eligible for direct constitutional protection, highlighting the complex nature of the right to women's entrepreneurship

According to contemporary human rights theory, complex rights are those whose effectiveness does not depend on a single norm or guarantee, but rather on the simultaneous convergence of multiple rights, constitutional principles, and public policies, as well as on the active intervention of the State to remove structural obstacles (Espinosa Aguilar, 2022; Martínez Martínez, 2017).

In this regard, the right to women's entrepreneurship has a complex legal nature, since its effective exercise cannot be guaranteed in isolation but requires the progressive and coordinated realization of various economic, social, and cultural rights, as well as civil and political rights all of which are underpinned by the principle of substantive equality and a gender perspective.

Women's entrepreneurship is closely linked to a range of interdependent rights, including the right to work, to equality and non-discrimination, to social security, to education and training, to access to credit, to development, and to a dignified life. The Constitutional Court of Ecuador has stated that fundamental rights are indivisible and interdependent, such that a violation of

one of them affects the effective enjoyment of the others (Constitutional Court of Ecuador, Ruling No. 1462-14-EP/20).

Thus, a woman cannot truly exercise her right to entrepreneurship if she lacks access to financial education, means of production, or social protection, or if she faces structural discrimination within the economic system. This interdependence makes women's entrepreneurship a composite right, the effective exercise of which requires the concurrence of multiple constitutional guarantees.

The complex nature of the right to women's entrepreneurship is also evident in the variety of state obligations it entails. It is not merely a duty of abstention (not to discriminate), but rather positive, immediate, and progressive obligations aimed at creating the material conditions for its effective exercise.

The Ecuadorian Constitutional Court has established that economic and social rights impose on the State duties of respect, protection, and guarantee, which include the formulation of public policies, the allocation of resources, and the adoption of affirmative action measures (Constitutional Court of Ecuador, Ruling No. 10-18-SEP-CC). In the case of women's entrepreneurship, these obligations range from the design of productive inclusion programs to the adaptation of the economic regulatory framework with a gender perspective.

Women's entrepreneurship has a dual dimension: individual and collective. At the individual level, it protects women's freedom to develop autonomous economic initiatives; at the collective level, it manifests itself in associative, community-based, and popular and solidarity-based economic ventures, especially in rural and intercultural contexts.

This dual dimension reinforces its legal complexity, as it involves the simultaneous protection of individual and collective rights, recognized by the Ecuadorian Constitution (CRE, 2008, Arts. 11, 283, and 319), which requires differentiated regulatory and policy responses from the State.

Unlike traditional civil liberties, the right to women's entrepreneurship is not fulfilled solely through legal recognition but requires active implementation through public policies, development plans, financing programs, and social protection systems.

The Constitutional Court has held that the effectiveness of economic and social rights depends on their integration into state planning and public policies, in accordance with the principle of progressivity (Constitutional Court of Ecuador, Ruling No. 1149-19-JP/21). This structural dependence on public action reinforces the complex nature of the right to women's entrepreneurship.

Finally, women's entrepreneurship is a complex right because it is exercised within a context of structural gender inequality, characterized by historical gaps in access to resources, time, financing, and support networks. From a gender perspective, this right cannot be conceived in formal terms but rather in substantive terms, which requires differentiated measures and affirmative action.

The Ecuadorian Constitution imposes on the State the duty to guarantee substantive equality and to adopt measures to eliminate the actual inequalities affecting women (CRE, 2008, Art. 11.2). This requirement transforms women's entrepreneurship into a right that articulates distributive justice, recognition, and redistribution, reinforcing its normative and substantive complexity (Fraser, 2008).

In conclusion, the right to women's entrepreneurship is a complex right because:

- It integrates multiple interdependent fundamental rights

- It combines negative and positive state obligations
- It has both an individual and a collective dimension
- Its effectiveness depends on public policies
- It serves as a tool for correcting structural gender inequalities

This complexity justifies treating it as an enforceable economic and social right, fully enshrined in the Constitution of the Ecuadorian State of rights and justice. The subjects of the right to entrepreneurship would be everyone, and the linguistic qualifier "especially women" endows the right with dual subjects, encompassing entrepreneurship and women's entrepreneurship as both a gender and a category within the economic sphere with women as the subjects, both individually and collectively, in all their social, cultural, ethnic, and territorial diversity.

The Ecuadorian Constitution recognizes women as full holders of rights and establishes an express mandate of substantive equality and non-discrimination, which enables the adoption of specific measures to guarantee the effective exercise of their economic rights (Constitution of the Republic of Ecuador [CRE], 2008, Arts. 11.2 and 66.4). The Constitutional Court has held that women constitute a historically discriminated-against group and that, therefore, they are entitled to enhanced protection based on the principle of substantive equality and non-discrimination (Constitutional Court of Ecuador, Ruling No. 34-19-IN/21).

Furthermore, the gender perspective incorporated into the Constitution allows for the recognition of collective entitlement to this right in contexts such as the popular and solidarity economy, productive associations, community-based enterprises, and women's organizations which are particularly relevant in rural areas and among indigenous peoples and nationalities (CRE, 2008, Arts. 283 and 319). This collective dimension reinforces the inclusive nature of women's entrepreneurship as a constitutionally protected right.

The purpose of the right to women's entrepreneurship is to ensure women's effective, equitable, and non-discriminatory access to productive economic activity, under conditions that enable them to create, sustain, and develop dignified economic initiatives. This purpose is directly linked to the right to work, to economic development, and to a dignified life (CRE, 2008, arts. 33, 66.2, and 275). The Constitutional Court has established that economic and social rights are not satisfied by mere formal recognition but require material conditions that make their effective exercise possible (Constitutional Court of Ecuador, Ruling No. 3-19-JP/20).

From a constitutional perspective, the scope of the right is not limited to the formal freedom to engage in entrepreneurship but encompasses the material conditions necessary to make it possible, such as access to financing, training, markets, technology, and legal certainty. In this regard, the Ecuadorian Constitution establishes that the economic system must be social and based on solidarity, oriented toward human beings rather than capital, which legitimizes state intervention to correct structural inequalities that disproportionately affect women (CRE, 2008, Art. 283).

The content of the right to women's entrepreneurship consists of a set of state powers, guarantees, and obligations that enable its effective exercise. From the perspective of fundamental rights theory, this scope includes both negative obligations refraining from discriminatory practices and positive obligations actions to foster, protect, and promote on the part of the State (Espinosa Aguilar, 2022; Martínez Martínez, 2017). The Constitutional Court has clarified that economic and social rights impose immediate and progressive duties on the State and are fully enforceable in court when their violation affects human dignity (Constitutional Court of Ecuador, Ruling No. 10-18-SEP-CC).

In the Ecuadorian context, the content of this right is specified as follows:

- The prohibition of discrimination on the basis of sex in access to economic and productive activities (CRE, 2008, Art. 11.2).
- The adoption of public policies for economic and productive inclusion with a gender perspective (CRE, 2008, arts. 275 and 341).
- The promotion of entrepreneurship within the framework of the popular and solidarity economy, with priority given to historically excluded groups, including women (CRE, 2008, arts. 283 and 309).
- Guaranteeing access to means of production, credit, and training as part of the right to work and economic development (CRE, 2008, Arts. 33 and 334).

This legal framework makes it clear that women's entrepreneurship is not a discretionary policy but a constitutionally enforceable obligation, insofar as it constitutes a means for the realization of fundamental rights.

Women's entrepreneurship, as an economic and social right, is governed by the constitutional principles of human rights, which guide its interpretation and application. The Constitutional Court has recognized that these principles have direct normative force and constitute mandatory parameters for the design of public policies and the interpretation of economic regulations (Constitutional Court of Ecuador, Ruling No. 1149-19-JP/21).

First, the principle of human dignity serves as the axiological foundation of the right, recognizing that economic autonomy is an essential condition for a dignified life (Mesa León, 2023).

Second, the principle of substantive equality legitimizes the adoption of affirmative action and differentiated policies in favor of women entrepreneurs, with the aim of correcting historical structural inequalities (CRE, 2008, Art. 11.2; Manosalvas, 2014). Added to this is the principle of progressivity and non-regressivity, which obligates the State to constantly expand the levels of protection and support for women's entrepreneurship and to refrain from adopting measures that entail unjustified setbacks (Arrubia, 2018).

Finally, the pro persona principle requires that regulations concerning economic and productive activity be interpreted in the manner most favorable to the full realization of women's rights, thereby allowing for the constitutional recognition of women's entrepreneurship as an implicit right derived from the open catalog of rights recognized in the Ecuadorian Constitution (CRE, 2008, Art. 11.5).

To conclude, and further underscoring its complex nature, the Constitutional Court has developed the doctrine of the interdependence of rights, noting that the violation of an economic right can affect the effective enjoyment of other fundamental rights (Constitutional Court of Ecuador, Ruling No. 1462-14-EP/20). Women's entrepreneurship is closely linked to a set of related rights, whose interdependence reinforces its status as a constitutional right. Among these are the right to work, the right to equality and non-discrimination, the right to social security, the right to education and training, and the right to development (CRE, 2008, arts. 33, 66, 26, and 275).

Likewise, women's entrepreneurship is linked to the right to live a life free from violence, insofar as economic autonomy reduces situations of dependency and structural vulnerability (ECLAC, 2021). This interdependence of rights confirms that women's entrepreneurship cannot be addressed in isolation, but rather as part of a constitutional framework aimed at guaranteeing good living and social justice.

Consequently, the 2008 Ecuadorian Constitution provides a solid regulatory framework for recognizing and protecting women's entrepreneurship as an economic and social right, integrating it into the system of fundamental rights and the state's obligations regarding equality, inclusion, and development.

Table 1. *Matrix of Women's Entrepreneurship as a Constitutional Right with Evaluation Indicators*

Right Involved	Constitutional Provision	State Obligation	Related public policy	Evaluation indicators
Substantive equality	Art. 11.2 CRE	Adopt affirmative action measures for women entrepreneurs.	Productive inclusion programs with a gender focus.	Percentage of female beneficiaries; reduction of the gap in access to financing.
Right to Work	Art. 33 CRE	Ensure decent conditions for self-employment.	Programs to formalize and promote entrepreneurship.	Rate of formalization of women-led businesses; average income.
Right to Development	Art. 275 CRE	Promote inclusive economic development.	Social and solidarity economy strategies.	Women's participation in strategic productive sectors.
Social Security	Art. 34 CRE	Expand coverage for self-employed workers.	Social protection systems for entrepreneurs.	Number of women enrolled in social security.
Right to Education	Art. 26 CRE	Ensure vocational and technical training.	Productive and financial training programs.	Level of training achieved; sustainability of the business venture.

Note: CRE = Constitution of the Republic of Ecuador (2008). Prepared by the author based on the Constitution of the Republic of Ecuador and the rights-based approach applied to women's entrepreneurship.

Legal and Structural Barriers to Women's Entrepreneurship in Ecuador

The legislative and regulatory gaps affecting women's entrepreneurship in Ecuador manifest not only as a lack of laws, but primarily as regulatory fragmentation, the apparent neutrality of economic law, and the failure to mainstream a gender perspective in production, financial, and labor regulations. This situation creates a deficit in legal protection that directly impacts the formalization, sustainability, and enforceability of women-led enterprises.

From the perspective of contemporary constitutionalism, an economic activity is constitutionalized when:

1. Its direct link to fundamental rights is recognized;
2. A constitutionally protected subject is identified;
3. Specific state obligations are established;
4. Enforcement and oversight mechanisms are established (Espinosa Aguilar, 2022; Manosalvas, 2014).

In the case of women's entrepreneurship, the lack of specific regulation prevents this process of constitutionalization from being completed. Although entrepreneurship is materially connected to rights such as the right to work (Art. 33), substantive equality (Art. 11.2), access to the means of production (Art. 334), social security (Art. 34), and the right to a dignified life (Art. 66.2), there is no explicit legal provision recognizing it as a protected aspect of these rights from a gender perspective. Nor has this been achieved through a Supreme Court ruling, which would be one option.

This situation creates a significant constitutional gap: the right exists in its substantive dimension but lacks sufficient legal substance, which hinders its enforceability in court.

As Mesa León (2023) notes, fundamental rights lose their effectiveness when they lack adequate legal, institutional, and procedural safeguards, resulting in a gap between formal recognition and the effective enjoyment of the right.

In the Ecuadorian context, entrepreneurship regulation is characterized by a neutral approach, designed according to abstract parameters of formal equality, which fails to account for the structural inequalities women face in accessing credit, property, time, productive networks, and social protection. This regulatory neutrality perpetuates material inequalities, contravening the principle of substantive equality enshrined in Article 11.2 of the Constitution and elaborated upon by the Constitutional Court in its consistent case law.

Likewise, regulations related to the popular and solidarity economy, the simplified tax regime, or productive development programs do not systematically incorporate differentiated measures or affirmative action, which limits their ability to address historical disparities. This constitutes a relative regulatory omission, subject to constitutional review.

The Organic Law on Entrepreneurship and Innovation (published in the Official Register No. 151 on February 28, 2020) constitutes the primary legal framework for incentivizing and promoting entrepreneurship, innovation, and technological development in Ecuador. Its purpose is to establish a comprehensive regulatory framework that facilitates the creation, operation, restructuring, and dissolution of enterprises, promoting public policies, financial incentives, new corporate structures, and simplified mechanisms for productive and competitive development across various economic sectors, whether public or private.

Among the principles and mechanisms promoted by this Law are the following:

- The creation of the National Entrepreneurship Registry (RNE), responsible for classifying projects and providing access to support programs.
- The establishment of public policies and programs providing technical, financial, and administrative support.
- The promotion of the efficiency and competitiveness of startups, as well as greater coordination between the national productive system and educational institutions, with the aim of strengthening entrepreneurial capabilities.

Through these provisions, the Act aims to provide legal certainty for entrepreneurship in general and reduce procedural, administrative, and resource-access barriers, with the goal of expanding the country's productive base.

Despite its progress, the Organic Law on Entrepreneurship and Innovation does not explicitly incorporate a gender perspective or specific measures aimed at women entrepreneurs as vulnerable actors within the productive ecosystem. Its generalized wording treats entrepreneurship as a neutral activity, without distinguishing the structural gender gaps that directly affect women such as reduced access to capital, productive networks, productive time, and unequal access to financial resources (an issue that, in fact, has been the subject of more recent and specific supplementary regulations on the economy of women entrepreneurs).

The absence of gender-sensitive regulatory guidelines in the Entrepreneurship Act therefore creates a significant regulatory gap that hinders the achievement of genuine equality for women entrepreneurs, particularly those in situations of socioeconomic vulnerability, as well as those living in rural areas, indigenous communities, or of African descent. This gap not only perpetuates the formal neutrality of the regulation but also prevents promotion and support measures from being tailored to address existing inequalities.

In 2023, the Organic Law to Promote the Economy of Women Entrepreneurs was enacted, which specifically aims to address the regulatory gap that the general entrepreneurship law failed to address. The purpose of this law is to promote the economic empowerment of women entrepreneurs in all their diversity, strengthening their access to financing, markets, training, and technology, with an explicit focus on equity and social sustainability.

The General Regulations of this Law adopt specific measures aimed at women entrepreneurs, prioritizing the inclusion of rural, indigenous, Afro-Ecuadorian, and vulnerable women, and assigning oversight responsibilities to entities such as the Superintendency of Banks and the Superintendency of Popular and Solidarity Economy to ensure gender-sensitive loans and programs.

The existence of these specialized regulations demonstrates that the Organic Law on Entrepreneurship and Innovation, while valuable in general terms, was insufficient to address structural gender inequalities a fact that led to the creation of complementary regulations with a specific focus.

The Organic Law to Promote the Economy of Women Entrepreneurs represents a significant step forward in recognizing women's economic empowerment as a public policy objective. However, from a legal-constitutional and human rights perspective, it contains significant regulatory shortcomings that limit its effectiveness as an instrument for guaranteeing women's entrepreneurship understood as an enforceable economic and social right.

One of the law's main shortcomings lies in its distinctly programmatic nature. Most of its provisions are aimed at promoting, fostering, and advancing women's entrepreneurship, but they lack clear legal mechanisms that would allow for their direct enforceability.

The law does not expressly recognize women's entrepreneurship as a subjective right, but rather as a public policy objective, which weakens its normative force. In constitutional terms, this makes it difficult for women entrepreneurs to seek judicial redress for the state's failure to fulfill its obligations, thereby contravening the principle of justiciability of economic and social rights recognized by the Constitutional Court of Ecuador and specialized legal doctrine (Martínez Martínez, 2017; Mesa León, 2023).

Although the Law makes general reference to equality and economic empowerment, it does not explicitly link these concepts to the constitutional rights enshrined in the 2008 Constitution, such as:

- The right to work (Art. 33),
- The right to substantive equality (Art. 11.2),
- The right to development and a dignified life,
- The principles of progressiveness and non-regressiveness of economic and social rights.

This omission weakens its interpretation in accordance with the law and in favor of the individual, and makes it difficult to use as a direct standard for reviewing constitutionality. In a constitutional state based on rights and justice, sector-specific laws should explicitly incorporate their role in the normative development of fundamental rights (Manosalvas, 2014).

The Law identifies multiple institutional actors (ministries, public financial institutions, oversight agencies), but it does not precisely define the enforceable legal obligations of each, nor does it establish:

- Minimum coverage standards,
- Quantifiable targets,
- Deadlines for compliance,
- Legal consequences for noncompliance.

From the perspective of economic and social rights theory, this lack of clarity weakens the normative content of the law, as state obligations remain within the realm of administrative discretion rather than legal duty (Arrubia, 2018).

Although the Law is aimed at women entrepreneurs, it does not robustly develop the concept of affirmative action, nor does it establish mandatory differentiated criteria for women in situations of greater vulnerability (rural women, Indigenous women, women of African descent, female heads of household, victims of violence, and women with disabilities).

This creates the risk of covert formal equality, where all women are treated as a homogeneous group, disregarding the intersectional inequalities that deepen economic exclusion a concern that has been expressly raised by the CEDAW Committee.

Like most laws that established rights during the era of social constitutionalism, this Act does not incorporate a regulatory system of evaluation indicators or periodic accountability requirements regarding:

- The actual impact of policies,
- The reduction of economic gaps,
- The formalization of women-led businesses,

- Effective access to financing and markets.

This shortcoming prevents the measurement of the degree to which the right is being fulfilled and undermines the possibility of judicial review of public policies a central aspect of contemporary constitutional jurisprudence on social rights (Constitutional Court of Ecuador; Mesa León, 2023).

Finally, the Law does not expressly incorporate binding international standards, particularly those derived from CEDAW, General Recommendation No. 34 on the economic rights of rural women, and General Recommendation No. 25 on temporary special measures.

This omission limits the law's interpretation in accordance with international human rights law and undermines the duty to ensure compliance with international conventions that rests with all State authorities, including the legislative branch.

There are other obstacles associated with the law, such as structural gender inequalities that are reflected in significant gaps in employment participation and quality, which directly affect women's entrepreneurship. For example, the rate of decent employment which includes formal conditions, a living wage, and full-time work was just 28.3% among women, compared to 40.6% among men, according to figures from the National Institute of Statistics and Censuses (INEC, 2025).

Furthermore, women face a significant income gap: women's average income is approximately 20% lower than that of men, which reduces their ability to accumulate capital and invest in productive initiatives.

This socioeconomic context is compounded by cultural stereotypes and unpaid care work, which are not always reflected in official statistics but widen the gap in the time available for women to engage in entrepreneurship and access productive networks (ECLAC, 2021; Molina Barzola et al., 2026).

Economic justice here refers to women's ability to obtain effective remedies against discriminatory practices in economic and productive spheres. This limitation is reflected, for example, in the higher rate of informality among women: according to the Global Entrepreneurship Monitor (GEM) and the National Institute of Statistics and Censuses (INEC, 2025), approximately 58 out of every 100 working women were in the informal sector, with 60% considering themselves self-employed without access to social security or formal benefits.

Informality and limited access to credit or effective financial services reduce the ability to seek judicial or administrative remedies to protect their economic rights, thereby exacerbating precariousness.

Informality represents a structural barrier to the sustainability and growth of women-led enterprises. In addition to the lack of access to social security, formal credit, or employment benefits, informality perpetuates income inequality and limits women's participation in strategic productive sectors.

In Ecuador, overall informality rates exceed 50% and have not shown significant declines in recent years, suggesting the need for comprehensive approaches that go beyond regulatory simplification and facilitate formalization with a gender-sensitive approach.

A Proposal: The Theoretical Construct as a Tool for Strategic Constitutional Litigation

To assert, through jurisdictional guarantees, what the Constitution implicitly provides, by elaborating on or compelling an explicit ruling that makes this right enforceable against the State. Here, the theoretical construct of women's entrepreneurship as a complex economic and social right takes center stage, playing a key role in legal practice. This construct enables the legal profession to:

a) Reconceptualize women's entrepreneurship as a derived fundamental right

Through a systematic and consistent interpretation, attorneys can argue that women's entrepreneurship is not merely a discretionary public policy but a concrete manifestation of the exercise of interdependent constitutional rights, which enables its assertion in constitutional proceedings. The Constitutional Court has recognized that rights are not limited to their literal wording but include implicit content derived from human dignity and the pro persona principle.

b) Identify unconstitutional regulatory omissions

This framework makes it possible to demonstrate that the absence of gender-sensitive regulation constitutes a relative legislative or administrative omission, insofar as the State has regulated entrepreneurship but has done so in an incomplete and discriminatory manner. The Ecuadorian Constitutional Court has recognized this category as subject to review, especially when it affects historically discriminated-against groups.

c) Initiate constitutional and treaty compliance reviews

By linking women's entrepreneurship to CEDAW, the Belém do Pará Convention, and inter-American case law, attorneys can demand that the Constitutional Court apply conventionality review, thereby reinforcing the State's duty to adopt temporary special measures to guarantee women's economic equality.

d) Justifying the call for affirmative action

The theoretical framework supports the argument that differentiated measures do not violate equality but rather constitute constitutional mandates for structural correction, in accordance with the doctrine of substantive equality developed by the Constitutional Court. Thus, women's entrepreneurship is presented as a legitimate area for the adoption of incentives, quotas, preferential lines of credit, and enhanced protection mechanisms.

The consistent use of this theoretical construct in strategic litigation can lead to a structural ruling by the Constitutional Court, aimed at:

- Explicitly recognizing women's entrepreneurship as a protected aspect of economic and social rights;
- Declare the existence of an unconstitutional regulatory gap;
- Order the legislature and the executive branch to adopt gender-sensitive laws and public policies;
- Establish evaluation parameters and compliance indicators, thereby strengthening the justiciability of the right.

In this regard, women's entrepreneurship is not only a matter of public policy but also a constitutional issue, the resolution of which requires the active intervention of the constitutional judiciary in defense of substantive equality and human dignity.

Regulatory reforms are needed to incorporate a gender perspective across the board into economic, labor, and financial regulations. This involves, for example, subsidized interest rates for women entrepreneurs, longer grace periods, differentiated requirements for collateral or personal guarantees, the creation of a state fund to back loans granted to women without a credit history, priority for rural women, indigenous women, women of African descent, and female heads of household, progressive income tax exemptions or reductions during the first years of a business venture, special deductions for productive reinvestment, simplified tax regimes tailored to women-led microenterprises, free and specialized tax assistance, legal recognition of women-led businesses transitioning to the formal sector, gradual access to labor and tax obligations, simplified procedures and free technical support, special enrollment schemes for self-employed women, flexible and phased contributions, coverage for maternity, illness, occupational hazards, and caregiving, training in business management, finance, digitalization, and e-commerce, programs tailored to rural and community contexts, public–private mentoring, and incubators and accelerators for women-led businesses, mandatory percentage quotas for women-led businesses, integration of women-led businesses into public and private value chains, daycare centers, child care facilities, and care for dependents, conditional cash transfers for women entrepreneurs with caregiving responsibilities, subsidies for digital connectivity, public marketing platforms, and technology training programs for women entrepreneurs.

The difference between support for women's entrepreneurship and social benefits and subsidies is that the government is not imposing a "fair" burden, but rather making an investment in productive development. Academia and civil society play a fundamental role in generating empirical evidence and critical analyses to inform public policy, in providing the necessary training, and in promoting support networks, mentoring, and continuing education for women entrepreneurs. Strengthening women's entrepreneurship requires a sustained commitment from the government and society, because contrary to popular belief constitutional mandates also place obligations on society.

Conclusions

Women's entrepreneurship constitutes a complex economic and social right, insofar as it articulates multiple fundamental rights work, material equality, development, social security, and a dignified life and imposes normative, institutional, and material obligations on the state. Its protection cannot be reduced to welfare policies; on the contrary, it must be recognized as an enforceable right within the framework of the constitutional state of rights and justice.

The 2008 Constitution of the Republic of Ecuador provides a solid regulatory framework for the recognition of women's entrepreneurship by enshrining substantive equality, the justiciability of economic and social rights, the principle of progressivity, and the direct application of international human rights treaties. Nevertheless, significant gaps persist between this constitutional recognition and its effective implementation.

The Organic Law to Promote the Economy of Women Entrepreneurs, while representing a political and regulatory advance, has structural shortcomings: its predominantly programmatic nature, the absence of clearly enforceable state obligations, the weakness of evaluation

mechanisms, and the limited incorporation of an affirmative action and intersectionality approach. These shortcomings limit the effectiveness of this legislation as an instrument for guaranteeing rights.

An analysis of normative, regulatory, socioeconomic, and cultural barriers corroborated by figures from the National Institute of Statistics and Censuses (INEC) shows that women entrepreneurs face higher levels of informality, lower incomes, an excessive care workload, and limited access to social protection. These conditions reveal persistent structural inequality that requires differentiated legal responses.

The case law of Ecuador's Constitutional Court has established relevant criteria regarding substantive equality, the justiciability of social rights, and conformity review, thereby creating a favorable environment for strategic litigation in support of women's entrepreneurship. The development of a solid theoretical and doctrinal framework enables the articulation of constitutional claims based on state action or inaction and facilitates structural rulings by the highest constitutional oversight body.

The alignment of domestic law with international standards in particular the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) reinforces the Ecuadorian State's obligation to adopt effective economic, regulatory, and administrative measures, including affirmative action, differentiated financing mechanisms, social protection, and equitable access to markets.

Strengthening women's entrepreneurship as a right therefore requires a comprehensive approach that combines regulatory reforms, inclusive public policies, effective judicial oversight, and the active participation of academia and civil society, aimed at achieving substantive and sustainable equality for women in the economic sphere. This comprehensive approach must encompass both legislative and administrative measures, as well as women's ability to enforce their rights through constitutional judicial safeguards. The legal construction of women's entrepreneurship as a complex right thus represents a significant contribution to contemporary constitutionalism in Latin America, in that it demonstrates that the guarantee of economic and social rights is not limited to their legal recognition but requires the adoption of transformative measures to correct historically accumulated structural inequalities. Women's entrepreneurship, understood as an economic and social right, thus emerges as a key instrument for achieving substantive equality, human dignity, and economic justice in contexts of profound gender inequality.

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Engagement with Society and Graduate Tracking: Contributions of Technological Higher Education to the 2030 SDGs

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Introduction

In the contemporary global context characterized by the acceleration of automation processes, the transition toward sustainable economies, and the persistence of informal labor structures technological higher education faces the challenge of moving beyond its traditional educational role to generate verifiable impacts on sustainable development. In this scenario, institutions of higher education (HEIs) assume a strategic role by aligning academic training with the social and productive needs of their communities, as well as by contributing to the achievement of the Sustainable Development Goals (SDGs) through the integration of their core functions of teaching, research, and engagement with society (Amorós Molina et al., 2023). This responsibility takes on particular relevance in technological higher education, given its close relationship with the training of professionals geared toward immediate entry into the workforce and addressing the specific needs of the productive and social sectors.

However, recent literature highlights a gap between institutional discourses focused on sustainability and the actual capacity of higher education institutions to measure and demonstrate the impacts of their actions, particularly in the Global South (Núñez Michuy et al., 2025). This limitation stems not only from operational factors but also from the insufficient integration of mechanisms that would allow for systematically linking academic training to graduates' subsequent career paths, their entry into the workforce, and the effects of engagement with the local community. When institutions lack systematic information on these trajectories, their ability to assess the extent to which the competencies developed during their education meet social and productive demands and, consequently, to use this evidence to guide institutional improvement processes is diminished.

In this regard, graduate tracking takes on a role that goes beyond mere compliance with regulatory requirements, serving as a mechanism for institutional feedback to analyze the relevance of academic programs and generate evidence on educational outcomes. Its utility lies in the ability to link information on competencies, continued education, labor market entry, employment conditions, and engagement with stakeholders in the broader community, thereby helping to assess higher education's contribution to objectives related to quality education, decent work, and strategic partnerships (Lema Cachinell et al., 2025). From this perspective, tracking is not an end in itself, but rather a tool for transforming information on graduates' trajectories into evidence that can guide decisions regarding curriculum, institutional operations, and community engagement.

At the same time, university-society engagement particularly through pre-professional internships and relationships with the private sector has been identified as a key component in

the transition from academic training to the workforce. Musa et al. (2025) report significant relationships between participation in internships and the development of competencies such as communication, adaptability, and digital skills, while Chen and Gan (2021) demonstrate the relationship between internship programs and the sustainable development of employability. In the field of vocational education, Pianda et al. (2024) highlight the importance of internship experiences for students' employability, while Zakaria et al. (2024) identify a recurring relationship between internship experiences and employability in the specialized literature. Likewise, studies conducted in Latin American technological contexts have pointed to the importance of pre-professional internships in strengthening students' ability to adapt to changes in the labor market (Arevalo Cordovilla et al., 2024). Taken together, this body of research allows us to view experiences of engagement with the productive sector as spaces for interaction that can facilitate the acquisition and application of skills, although their effects must be analyzed in relation to the specific conditions of labor market entry.

However, the transition from higher education to employment cannot be interpreted solely based on how quickly graduates secure a job. In Latin America, this transition takes place in contexts characterized by structural inequalities and high levels of labor informality conditions that can limit the quality and sustainability of career trajectories. Therefore, it is necessary to make a conceptual distinction between employability, labor market entry, and decent work. Employability relates to the skills and conditions that facilitate entry into and retention in the labor market, while decent work encompasses dimensions associated with formality, stability, remuneration, and adequate employment conditions fundamental aspects for assessing the contribution to SDG 8 (Serafini et al., 2022). This distinction is particularly relevant for technological higher education, since early labor market entry can coexist with employment conditions that do not necessarily correspond to a sustainable career path.

Compounding this situation are the existing mismatches between the skills developed during training and the changing demands of the labor market. Although technical education can strengthen technical and transferable skills relevant to professional performance, the alignment between training and employment is also conditioned by factors external to the education system, including the characteristics of the labor market and the opportunities available in each context (Ziliwu et al., 2025). Consequently, the relationship between academic education, employability, and sustainable development cannot be understood as a linear or automatic process. The relevance of education is a necessary but not sufficient condition for ensuring sustainable career paths; therefore, the analysis of educational outcomes must incorporate both the competencies acquired and the conditions under which they are applied.

From this perspective, university-society engagement takes on a strategic dimension by constituting a process of interaction and feedback between the institution and stakeholders in the surrounding community. Its scope should not be limited to the formalization of agreements or the development of isolated activities, but should incorporate mechanisms that allow for an understanding of the outcomes of these interactions and the use of that information to strengthen educational processes. The participation of social and economic stakeholders in the planning and evaluation of educational processes fosters a stronger connection between the needs of the surrounding community and institutional responses (Ashida, 2023). However, the effectiveness of this engagement may be limited by constraints related to resources, institutional capacities, and the integration of core functions (Nhamo and Chapungu, 2024). Within this framework, graduate tracking can play a coordinating role by providing information on

educational outcomes and on how engagement experiences relate to professionals' subsequent career paths.

Thus, the research question is not limited to determining whether institutions have mechanisms for tracking graduates, but rather to understanding the extent to which the information generated by these mechanisms can be integrated with university-society engagement and used to demonstrate concrete contributions to the SDGs. This issue is significant because the mere existence of information on graduates does not in itself guarantee institutional improvement processes; its value depends on the capacity of higher education institutions to analyze it, integrate it with other sources of evidence, and translate its findings into decisions related to education, engagement, and the relationship with the productive sector. In this context, the following research question arises: How does graduate tracking contribute to strengthening the university-society partnership and to the achievement of the Sustainable Development Goals in technological higher education?

Based on this question, the chapter aims to analyze graduate tracking as a mechanism for institutional feedback that allows for an understanding of the relationship between academic training, employability, and sustainable development, considering its connection to educational relevance and the formation of strategic partnerships. The analysis therefore seeks to move beyond an exclusively descriptive view of graduate tracking and examine its potential as a source of evidence to strengthen the link between technological higher education, the business sector, and the Sustainable Development Goals.

To address this approach, the chapter is structured into three main sections. The first analyzes the university-society partnership and graduate tracking as a research problem, considering their conceptual and empirical foundations. The second section presents the methodological process and the results obtained from the study conducted at the Bolivarian Technological Institute. Finally, the third section provides analysis and interpretation of the results, aimed at understanding their implications for technological higher education, employability, engagement with the local community, and the contribution to the Sustainable Development Goals.

Factual Characterization: University-Society Engagement and Graduate Tracking

In the context of technological higher education, university-society engagement has established itself as a strategic pillar for aligning educational processes with the social, economic, and productive dynamics of the surrounding environment. This substantive function involves an interactive relationship between higher education institutions and external stakeholders, through which the knowledge, competencies, and skills developed in academic processes can address specific societal needs. However, its development has been marked by a structural tension between its discursive recognition and the limited institutional capacity to demonstrate verifiable impacts on sustainable development (Núñez Michuy et al., 2025). This gap reflects not only operational constraints but also methodological weaknesses in systematically evaluating how engagement activities relate to educational outcomes, graduate placement, and the transformations occurring in the surrounding community.

From this perspective, engagement with society should not be reduced to the implementation of activities, projects, or agreements, but rather understood as a process capable of generating information for institutional improvement. Interaction with companies, social organizations, and

other stakeholders in the community makes it possible to identify competency needs, opportunities for practical learning, and conditions that influence students' transition into the workforce. Therefore, evaluating engagement requires mechanisms capable of assessing its outcomes beyond mere compliance with scheduled activities. In this regard, graduate tracking takes on particular importance, as it allows for the collection of information on post-education trajectories and establishes connections between educational experiences, the skills developed, and their application in workplace and social contexts.

Within this framework, graduate tracking becomes significant as an analytical tool that allows us to move beyond purely descriptive approaches and advance toward evaluation models based on actual pathways to employment. Beyond its regulatory nature, this mechanism makes it possible to establish empirical links between the education received, the competencies developed, the transition to employment, and their application in productive contexts, contributing to an understanding of higher education's contributions to the Sustainable Development Goals (Lema Cachinell et al., 2025). Its institutional value lies, therefore, in transforming graduates' experiences into evidence that can be used to inform curricular processes, strengthen relationships with the surrounding community, and guide decisions regarding the relevance of education.

The literature shows, however, that the relationship between education, engagement with the community, and employment outcomes is neither linear nor automatic. Pre-professional internships provide important opportunities to expose students to real-world work situations and foster the development of competencies, but their effects depend on the characteristics of the educational experiences and labor market conditions. Various studies have identified significant relationships between pre-professional internships, competency development, and employability (Musa et al., 2025; Chen and Gan, 2021), while research focused on vocational training contexts highlights the importance of practical experiences in preparing students for the transition to employment (Pianda et al., 2024). Consequently, internships can serve as a mechanism for linking educational institutions with the productive sector, although they do not in and of themselves guarantee a stable or formal career path. This consideration is important to avoid oversimplified interpretations in which early entry into employment is assumed to be sufficient evidence of the impact of training.

Added to this complexity is the need to distinguish between relevant training, employability, labor market entry, and decent work. Employability encompasses the skills and conditions that facilitate a person's access to and retention in the labor market, while labor market entry refers to the process through which a graduate secures employment. Decent work also incorporates dimensions related to formality, stability, working conditions, and opportunities for professional development. This distinction is particularly important in contexts where informality is a structural feature of the Latin American labor market (Serafini et al., 2022). In this regard, an institution can contribute to strengthening skills and employability without having the direct capacity to alter the structural conditions that determine the availability and quality of jobs.

Likewise, recent research warns that, despite the development of technical skills in technology education, mismatches persist between academic training and the changing demands of the labor market (Ziliwu et al., 2025). The literature on employability in technical training contexts also highlights the importance of considering the alignment between the skills developed during training and the demands of the occupational environment (Zakaria et al., 2024). These perspectives help us understand that educational relevance cannot be assessed solely based on the existence of acquired skills or on indicators of access to employment. It is necessary to

consider how these competencies are recognized and utilized in the labor market, as well as the institutional and structural conditions that may facilitate or limit their conversion into sustainable job opportunities.

Consequently, the relationship between higher education, employability, and sustainable development must be understood as a multidimensional process. Academic training is a fundamental component, but it interacts with industry engagement experiences, pre-professional internships, employer characteristics, and labor market conditions. From this perspective, graduate tracking can help identify the points of connection and potential gaps between these components. The information obtained reveals not only whether graduates secure employment but also which skills they use, how they evaluate the education they received, what difficulties they face in their careers, and which environmental factors shape their opportunities. Thus, graduate tracking can serve as a feedback mechanism that links post-graduation experiences to institutional improvement processes.

Based on this logic, the research problem is not limited solely to the existence of follow-up mechanisms, but rather to the insufficient analytical coordination between graduate follow-up, university-society engagement, and the measurement of their effective contribution to the SDGs. This lack of coordination limits the generation of robust evidence for institutional decision-making, the evaluation of the relevance of education, and the design of engagement strategies capable of responding to the needs of the surrounding community. Therefore, the challenge lies not only in collecting information on graduates but also in integrating it with e y evidence derived from educational processes and institutional relationships with the productive and social sectors.

For this reason, the authors propose as a general hypothesis that systematic graduate tracking, as an institutional feedback mechanism based on empirical evidence, can strengthen university-society engagement and provide evidence to assess its contribution to the Sustainable Development Goals in technological higher education.

This formulation is grounded in the convergence between the reviewed theoretical background and the problem identified in the study context, in which graduate tracking constitutes a potential mechanism for comprehensively understanding the relationship between academic training, employability, engagement with the community, and sustainable development.

The research design is based on a sequential mixed-methods approach, in which the quantitative component initially characterized indicators of employability and career trajectories, while the qualitative component was used to delve deeper into and interpret those results. In this way, the quantitative analysis of graduates' employability and career trajectories is integrated with the qualitative interpretation of university-society engagement processes and their relationship to the Sustainable Development Goals. The combination of these two components allows the evidence obtained through indicators of labor market entry, competencies, and employment conditions to be complemented by the perceptions of stakeholders involved in the educational process and the productive sector. In this way, the mixed-methods approach fosters a comprehensive understanding of the phenomenon under study and enables the comparison of different sources of information (Núñez Michuy et al., 2025; Musa et al., 2025).

The study adopts a descriptive-analytical cross-sectional design aimed at examining the dynamics of labor market integration, skills development, and articulation with the productive environment among graduates of the Bolivarian Technological Institute. The analysis considers data from the 2020–2025 period, a timeframe that encompasses both the disruption caused by

the pandemic and the subsequent process of recovery and transformation of labor dynamics (Arevalo Cordovilla et al., 2024).

The study population consisted of graduates from the Business Administration, Automotive Mechanics, and Podiatry programs. The sample, which was a non-probabilistic, purposive sample, included 180 graduates, 15 academic coordinators, 11 employers, and institutional staff. Including these stakeholders made it possible to address the phenomenon from complementary perspectives: graduates provided information on their career paths and the usefulness of the training they received; academic coordinators and institutional staff provided information related to academic and follow-up processes; and employers contributed their assessment of performance and the competencies required in the workplace. This selection was based on the relevance of the informants to the analysis of technical training and its integration with the productive context (Lema Cachinell et al., 2025).

Three main instruments were used for data collection. First, a structured five-point Likert-type survey was administered, consisting of 42 items related to competencies, employability, and engagement. The instrument demonstrated high internal consistency (α = 0.93) and a KMO index of 0.89, indicating an adequate measure of sample adequacy for analyzing the structure of the variables. Second, a literature review of institutional reports and records of agreements was conducted to identify evidence related to labor market integration and its alignment with the SDGs. Finally, semi-structured interviews were conducted with key stakeholders to gain deeper insights into perceptions regarding the relevance of training, the required competencies, and the barriers associated with labor market entry (Tafakur et al., 2024; Ziliwu et al., 2025; Musa et al., 2025).

Table 1. *Indicators of Alignment with the SDGs*

SDGs	Key Indicators
4 (Quality Education)	% utilization of soft/digital skills; rate of continued education (Amorós Molina et al., 2023).
8 (Decent Work)	Formal labor market entry; initial unemployment; occupational fit; wage mobility (Jebba et al., 2024).
17 (Partnerships)	Measurable active agreements; curricular collaboration; multisectoral networks (Pazuña Naranjo, 2026).

This approach not only describes realities but also proposes a scalable model for measuring SDG contributions in technology education, closing identified methodological gaps (Serafini et al., 2022).

Table 2. *ITB Employability Indicators (2020–2025)*

Indicator	Percentage	Observation
Employment within ≤6 months	73%	Institutional indicator

Formal employment	40.7%	Institutional indicator
Training satisfaction	84%	Institutional indicator
Continuation of Studies	49.8%	Institutional indicator
Entrepreneurship	11.1%	Institutional indicator

Source: The authors, based on institutional records from ITB (2025).

Regarding university-society engagement, the results show high ratings from employers, who rate graduates' performance as good or excellent in most cases, particularly highlighting adaptability and professional ethics. Furthermore, the data analyzed indicate that participation in pre-professional internships especially when they are paid is associated with higher levels of formal employment.

Similarly, there has been sustained growth in the number of institutional agreements with the private sector, reflecting a consolidation of strategic alliances and their contribution to strengthening collaborative networks. However, there is a clear need to implement digital monitoring systems to optimize information management and strengthen ties with graduates.

Table 3. *Alignment of ITB Programs with the SDGs*

SDGs	Key Evidence	Quantitative Indicator	Interpretive Scope
4	Satisfaction with training (84%); internships (87.7%)	Life/Work Skills	Relevance of Training
8	Employment placement (73%); suitability (68%); formality (40.7%)	Employment placement	Employment placement and working conditions
17	430 agreements; collaboration (81.8%)	Multisectoral networks	Coordination with local stakeholders

Source: The authors, based on institutional records from the ITB (2025) and triangulation of the study's sources.

In terms of comparative analysis, the results from the Bolivarian Technological Institute show favorable early labor market integration within the analyzed sample, although they reveal a significant gap related to the formality of employment. Furthermore, the trends identified in the literature regarding the influence of pre-professional internships and transferable skills on employability are confirmed.

The results obtained allow for an integrated analysis of the relationship between graduate tracking, university-society engagement, and their contribution to the Sustainable Development Goals in the context of technological higher education. The findings reveal a complex dynamic in which favorable outcomes in terms of labor market integration, evaluation of training, and recognition of competencies by employers coexist alongside structural limitations associated with the quality and formality of employment. This coexistence is significant because it demonstrates that the contribution of higher education to sustainable development cannot be assessed solely through graduates' access to the labor market but must also take into account the conditions under which such integration occurs.

One of the most significant findings is that 73% of graduates secure employment within six months or less. This pattern is consistent with the literature highlighting the importance of pre-professional internships and interaction with the productive sector in the transition from education to employment (Musa et al., 2025; Chen and Gan, 2021). From an institutional perspective, relatively rapid entry into the workforce can be interpreted as a positive indication of a match between certain skills developed during training and existing opportunities in the labor market. However, this indicator should be interpreted with caution, as the speed of entry into employment does not, in and of itself, provide information about the stability, formality, compensation, or suitability of that job.

This consideration takes on particular importance when comparing early labor market entry with the level of employment formality. Although 73% manage to enter the labor market within a relatively short period, only 40.7% secure formal employment. The difference between these two indicators is one of the study's central findings, as it allows us to distinguish between the ability to secure employment and the possibility of doing so under conditions compatible with a sustainable career path. This distinction aligns with the arguments put forth by Serafini et al. (2022) regarding the need to analyze the contribution of higher education institutions to the SDGs using indicators that go beyond immediate educational outcomes and take into account their social and labor market implications.

The coexistence of relatively high participation rates and lower levels of formality thus highlights a significant challenge for technical higher education. The results suggest that institutions can strengthen skills, facilitate practical experiences, and improve prospects for transitioning into the labor market, but they have limited capacity to change, on their own, the structural conditions under which employment is generated. Consequently, curricular relevance is a necessary but not sufficient condition for achieving the goals associated with SDG 8. The creation of decent work also depends on economic, productive, and institutional factors external to the education system. This interpretation helps prevent labor informality from being attributed exclusively to educational shortcomings and, at the same time, highlights the need to strengthen collaboration between higher education institutions, the productive sector, and other stakeholders involved in employment policies.

With regard to competencies, the results show a favorable assessment of dimensions such as ethics, communication, and adaptability. This assessment aligns with evidence that attributes a significant role to cross-cutting competencies in employability and in graduates' ability to function in changing work contexts (Musa et al., 2025). In particular, adaptability takes on importance in technology education due to the transformations associated with digitization, automation, and changes in the ways work is organized. The results are also consistent with Tafakur et al. (2024), who highlight the value of experiences interacting with real-world work environments for strengthening skills related to professional performance.

However, the positive assessment of cross-cutting competencies coexists with gaps in digital and language skills. This finding introduces a critical dimension regarding the relevance of training: the competencies that have proven sufficient to facilitate certain career paths may not fully meet the new demands of increasingly digitized and globalized labor markets. In this regard, the findings align with those of Lema Cachinell et al. (2025) regarding the usefulness of tracking graduates to identify the need to update training programs. The information obtained after graduation thus takes on prospective value, as it allows for the identification of competency areas that should be considered in curriculum review and improvement processes.

Table 4. *Competency Predictors (ITB vs. Academic Studies)*

Competency	ITB (%)	Literature (β/r)	Source
Ethics	73.4	r=0.68	(Musa et al., 2025)
Communication	63.3	**β** = 0.59	(Musa et al., 2025)
Adaptability	90.9	**β** = 0.55; path = 0.508	(Tafakur et al., 2024)
Digital	35.8	Deficit 64.2%	(Lema Cachinell et al., 2025)

Source: The authors (2026)

The comparison presented in Table 4 reveals correspondences between the competencies valued in the institutional context and those highlighted in the specialized literature. However, these data should be interpreted as points of comparison rather than direct statistical equivalences, since the percentages obtained in this study and the **β** or r coefficients reported by external research stem from different study designs, samples, and analytical procedures. Their usefulness therefore lies in identifying areas of convergence regarding the relevance of certain competencies for employability, rather than in establishing strict numerical comparisons between studies.

From the perspective of university-society engagement, employers' favorable assessment of graduates and the existence of collaborative networks through institutional agreements demonstrate the importance of maintaining systematic relationships with the business community. These interactions can facilitate opportunities for practical learning, provide information on in-demand competencies, and create pathways to employment. In this regard, pre-professional internships take on a role that goes beyond mere curricular requirements, serving as bridges between education and the real world of work. The reviewed evidence also indicates that internship and work-study experiences can enhance employability-related outcomes in both vocational and higher education contexts (Pianda et al., 2024; Zakaria et al., 2024).

However, the results also suggest that the strength of these linkages should not be evaluated solely based on the number of existing agreements. The presence of institutional agreements constitutes a favorable condition for cooperation, but their effective contribution depends on the intensity of the interaction, the results produced, and the existence of mechanisms to assess their impact. This interpretation aligns with Núñez Michuy et al. (2025), who emphasize the need to move toward forms of engagement capable of generating measurable results in local areas and communities. From this perspective, graduate tracking can complement traditional engagement indicators by providing evidence of what happens after students complete their education and enter the professional world.

The identified need to strengthen digital tracking systems takes on special relevance in this context. A tracking system does not automatically generate institutional improvements; its contribution depends on the collected information being analyzed, integrated, and utilized in decision-making processes. Therefore, the digitization of tracking should be understood not only as a technological improvement but as part of an institutional feedback system capable of linking graduates' career paths to curriculum review, career placement planning, and relationships with

employers. This interpretation reinforces the study's central argument: the strategic value of tracking lies in converting graduate data into evidence for institutional improvement.

In terms of the Sustainable Development Goals, the results reveal a particularly relevant relationship with SDGs 4, 8, and 17. Regarding SDG 4, satisfaction with education and the assessment of skills provide evidence of educational relevance, although digital and language gaps indicate areas in need of improvement. Regarding SDG 8, labor market integration is a positive outcome, but the lower level of formal employment indicates that access to employment does not necessarily equate to decent work. Finally, regarding SDG 17, the existence of agreements and interaction with employers reflect institutional capacities to build partnerships, although their assessment must consider not only their quantity but also the results derived from these relationships.

A combined analysis of these three goals reveals that the contributions of technological higher education to the SDGs are interrelated. Relevant training (SDG 4) can strengthen skills and facilitate the transition to employment, but achieving decent work conditions (SDG 8) also requires a productive environment capable of generating formal and sustainable job opportunities. In turn, partnerships with companies, public institutions, and other social actors (SDG 17) can expand opportunities for practical learning, curriculum feedback, and the transition to the workforce. Consequently, the contribution to the SDGs should not be understood as the isolated sum of indicators, but rather as a process of integration between education, industry engagement, and employment outcomes.

This interpretation also helps clarify the scope of institutional responsibility. The results do not allow us to attribute graduates' subsequent employment conditions exclusively to the institution, due to the influence of external factors related to the characteristics of the labor market and the productive context. However, they do highlight areas where higher education can make a difference: updating curricula, strengthening competencies, improving the quality of pre-professional internships, systematizing graduate tracking, and consolidating partnerships with external stakeholders. This clarification is important to avoid both overestimating and underestimating the role of higher education institutions in sustainable development.

Within this framework, graduate tracking serves as a coordinating mechanism among the various dimensions analyzed. Its importance lies not only in determining how many graduates are employed, but also in identifying how their transition to employment occurs, which skills they use, which are valued by employers, what gaps persist, and under what conditions their career trajectories unfold. When this information is integrated with career placement processes and academic planning, it can serve as evidence to guide institutional decisions and strengthen the relevance of technical higher education.

Finally, the results support the hypothesis put forward in the study, as they show that systematic tracking of graduates can provide relevant evidence to strengthen the university-society relationship and assess institutional contributions to the SDGs. However, this relationship must be understood as conditional rather than automatic: having information on graduates is the starting point, while its impact depends on the institutional capacity to translate that information into decisions, curricular adjustments, outreach strategies, and sustainable partnerships with stakeholders in the surrounding community. From this perspective, the main contribution of graduate tracking lies not only in describing career trajectories but also in creating a feedback loop among education, graduates, employers, and society.

Conclusions

The analysis conducted establishes that graduate tracking is a strategic mechanism for strengthening university-society ties in technical higher education by providing evidence on the relationship between academic training, career trajectories, and conditions in the labor market. In this regard, its utility goes beyond mere compliance with institutional or regulatory requirements, as the information generated can serve as input to inform academic processes, guide institutional decisions, and assess the contributions of higher education to the Sustainable Development Goals.

The findings show favorable results regarding graduates' transition into the labor market: 73% secure employment within six months or less, and 84% rate the education they received as useful or very useful. Added to this is employers' positive assessment of competencies such as ethics, communication, and adaptability. Taken together, these results are positive indicators of the relevance of the education provided and highlight the importance of maintaining mechanisms that allow for the systematic comparison of the skills developed during training with the needs of the labor market.

However, this early entry into the labor market contrasts with the 40.7% of graduates who secure formal employment. This discrepancy is one of the study's key findings and confirms the need to distinguish between labor market entry and decent work. Higher education can strengthen skills and facilitate the transition to the labor market, but the establishment of formal and sustainable career paths is also influenced by economic, productive, and labor-market factors external to the institution. Therefore, the contribution to SDG 8 should not be assessed solely based on access to employment, but also by considering the conditions under which that employment takes place.

In the area of skills, the results show strengths in cross-cutting dimensions valued by employers, but they also reveal gaps in digital and language skills. These results provide relevant information for curriculum feedback processes, as they allow for the identification of areas where training can be strengthened in response to labor market transformations. In this regard, graduate tracking is valuable not only as a diagnostic tool but also as a source of evidence to guide academic updating and improvement processes. Regarding university-society engagement, the findings highlight the importance of relationships with the business sector, particularly through agreements, pre-professional internships, and interaction with employers. However, the existence of these mechanisms alone does not constitute sufficient evidence of impact. Their effectiveness requires systematic monitoring and evaluation processes that make it possible to assess their results and use the information generated to strengthen both educational programs and institutional engagement strategies. From this perspective, graduate tracking complements traditional evaluations of university-society engagement by incorporating evidence on the subsequent career paths of those who participated in the educational programs. From the perspective of the Sustainable Development Goals, the results make it possible to identify contributions particularly related to SDG 4, through the relevance and value of the training; to SDG 8, through labor market integration and the critical analysis of employment conditions; and to SDG 17, through institutional coordination with stakeholders in the surrounding community. These dimensions do not operate independently: the quality and relevance of training can enhance employability, while partnerships with the productive sector can generate opportunities for practical learning, feedback, and the transition to employment.

In response to the research question, it is concluded that graduate tracking contributes to strengthening the university-society partnership when the information obtained on education, competencies, employment placement, and working conditions is used as evidence to inform institutional processes and relationships with stakeholders in the surrounding community. Its contribution to the SDGs, therefore, does not stem solely from having y information on graduates, but rather from the institutional capacity to transform that evidence into academic decisions, engagement strategies, and cooperation mechanisms aimed at improving the relevance and social impact of technological higher education. Consequently, the findings support the general hypothesis proposed and position graduate tracking as a unifying axis between academic training, university-society engagement, and sustainable development. The study's contribution lies in demonstrating that this integration makes it possible to move beyond a fragmented view of graduate tracking and advance toward an evidence-based management approach, in which graduates' trajectories serve as a source of information for understanding both institutional achievements and the gaps that require intervention. Its consolidation will ultimately depend on the systematic nature of the tracking, the ability to integrate the information into decision-making, and the sustainability of the partnerships established with social and economic actors.

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Artificial Neural Networks Applied to the Prediction of Urban Thermal Comfort

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Introduction

Rapid urbanization and the global climate change crisis have exacerbated the problem of maintaining comfortable thermal conditions in urban environments (Smith and Levermore, 2008; Takane et al., 2019). Urban areas, with their complex built environments, lack of vegetation, and increased human activities, generate a unique microclimate that often results in higher temperatures than in rural areas a phenomenon known as the urban heat island effect (Sad de Assis and Barros Frota, 1999; Tumini et al., 2016).

This phenomenon is not driven by a single physical mechanism but rather by the interaction of various environmental components. The replacement of natural cover with impervious surfaces and materials with high heat capacity alters the surface energy balance of cities, increasing the retention of radiant heat during the day and its delayed release at night (Ramsay et al., 2023). In addition to this radiative component, other factors include wind which is influenced by the urban canyon geometry and the roughness of the built environment moisture associated with soil sealing and reduced evapotranspiration, and urban metabolism, linked to anthropogenic heat released by vehicular traffic, artificial air conditioning, and industrial activity. The relative magnitude of these components varies depending on the climatic context: in tropical and coastal cities, optimizing urban geometry to promote natural ventilation and the use of reflective materials have yielded more significant temperature reductions than in temperate climates. Furthermore, the combination of multiple mitigation strategies (vegetation, surface albedo, and control of the aspect ratio between streets and buildings) is generally more effective than the implementation of isolated measures (Palme and Carrasco, 2022).

This effect can be particularly devastating in tropical climates, where high temperatures and high humidity make it difficult for the human body to regulate its temperature. Even a moderate increase of 2 to 3 °C can push the population close to its physiological limits, significantly increasing the likelihood of heat stress events (Knutson and Ploshay, 2016). This reality is especially relevant in Guayaquil, Ecuador, where, despite a certain tolerance among residents for conditions that exceed acceptable comfort limits, the outdoor environment during daylight hours is perceived as excessively hot, highlighting the need to integrate shading and ventilation strategies into urban design (Johansson et al., 2018). Finding ways to improve urban thermal comfort is essential, as it directly affects the health and well-being of the population (Ren et al., 2019).

Exposure to urban heat stress is not distributed evenly across the population. Recent evidence from tropical cities indicates that informal and low-income settlements often exhibit heat islands of comparable or greater magnitude than those in established areas with greater vegetation cover, while their residents have a considerably more limited capacity to adapt (less access to air

conditioning systems, building materials with poorer thermal performance, and limited green infrastructure) (Ramsay et al., 2023). This differential vulnerability is particularly relevant to the present study, which focuses on Socio Vivienda II, a social housing settlement in Guayaquil characterized by low-cost building types, reinforcing the need for agile predictive tools to anticipate the thermal performance of such environments and guide cost-effective bioclimatic urban design decisions.

Given the complexity of this challenge and the growing volume of available urban data, artificial intelligence techniques are emerging as tools with considerable potential (Zheng et al., 2014a). Artificial neural networks (ANNs) have demonstrated remarkable performance in urban computing and environmental analysis tasks, being used to estimate and predict quantities related to energy flow, heat balance, and air movement (Han et al., 2022; Wang & Cao, 2021). Unlike physical models, which require significant computational capacity and considerable simulation times (Han et al., 2020), ANNs using simulated data represent a more viable option for environmental analysis in early design phases: they require less input data, offer reduced computation times, and allow for faster results (Han et al., 2022). However, they have limitations: they require representative training data, are tailored to specific buildings, and lack explanatory insight into the building's physical parameters (Han et al., 2022). Examples of recent applications include ARINet, which predicts annual solar radiation intensities in the built environment using 3D convolutional networks, and its successor CoolVox, which improves the prediction of solar radiation on building facades (Han et al., 2020; Han et al., 2022).

Beyond predicting solar radiation on building facades, machine learning has gradually expanded to include the estimation of outdoor thermal comfort indices. Recent reviews document the use of regression algorithms, ensemble methods, and deep learning architectures including multilayer perceptrons and recurrent neural networks to predict the physiologically equivalent temperature (PET) and the universal thermal climate index (UTCI) based on meteorological and urban morphological variables, with performance superior to that of simple linear regression models (Mihalakakou et al., 2026). Similarly, studies comparing different models for predicting outdoor comfort based on urban and environmental parameters have shown that moderately complex architectures can match or outperform deeper models when the training dataset is limited (Pompei et al., 2024), while research aimed at generating high-resolution intra-urban UTCI maps has demonstrated the feasibility of replacing full numerical simulations with models trained on previous simulation outputs, replicating microclimatic patterns with reduced errors and significantly shorter computation times than those required for direct physical modeling (Briegel et al., 2024). Similarly, approaches based on generative adversarial networks have made it possible to produce thermal comfort maps associated with different configurations of vegetation, facade materials, and urban geometry, achieving a structural similarity of 96% compared to reference simulations and reducing computation time from approximately 30 minutes to just 3 seconds. These results demonstrate AI's potential to expand its application from point-specific predictions to tools supporting spatial design decision-making (Shahrestani et al., 2022). However, most of this evidence comes from cities with temperate climates or established urban contexts with ample availability of in-situ monitoring data. There are still few studies that apply and compare RNA architectures based on data generated through microclimatic simulation (ENVI-met) in low-income settlements with a humid tropical climate, such as the one addressed in this study.

The literature on neural networks applied to outdoor comfort indices also documents an evolution in the number and type of input variables considered. Pioneering studies trained neural

networks to estimate hourly PET values in different types of urban spaces (streets, squares, parks, courtyards, and arcades) using only air temperature recorded at a conventional weather station as input, and compared the results with PET calculated from field monitoring during an extreme heat episode in Athens (Moustris et al., 2018). Subsequent studies extended this approach to urban canyons, explicitly comparing models that incorporated all available meteorological variables with models based solely on air temperature: on a campus with a humid subtropical climate, multivariate models achieved substantially greater agreement with simulated PET, while univariate models maintained acceptable, albeit inferior, performance (Shah et al., 2022). In another study, conducted using a dataset of 5,088 hours of monitoring data from four streets in Gwalior, India, the same research group employed an adaptive neuro-fuzzy system (ANFIS) to rank the relative influence of the e meteorological predictors on the UTCI, finding that air temperature was the most influential variable in that particular dataset (Shah et al., 2023). These findings do not imply that air temperature universally replaces other microclimatic variables: mean radiant temperature and wind exhibit high microscale variability and often dominate outdoor thermal comfort during the day; therefore, a model with few predictors may be practical for monitoring or screening tasks, but it requires specific validation in the urban settings and weather events of interest (Briegel et al., 2024). In this context, the present study adopts a multivariate approach, incorporating eleven input variables, including urban geometry (FVC), spatial location, and comprehensive microclimatic variables, precisely because the available evidence suggests that reducing the set of predictors leads to a loss of accuracy that may be inadequate when the goal is to inform specific urban design decisions.

It should be noted that the thermal comfort index used in this study, the physiologically equivalent temperature (PET), was developed specifically for the bioclimatic assessment of outdoor spaces based on a human energy balance model, the Munich Energy-Balance Model for Individuals (MEMI), which explicitly integrates air temperature, relative humidity, wind speed, and mean radiant temperature (Höppe, 1999). One of its main advantages over other thermal indices is that it is expressed in degrees Celsius, which makes it easier for urban planners and designers without specialized training in biometeorology to interpret, and it is also suitable for comparing the thermal component of climates that are very different from one another (Matzarakis et al., 1999). These characteristics explain why the PET has established itself as one of the benchmark indices for evaluating thermal comfort in public spaces and for the bioclimatic characterization of the urban heat island.

It is also important to distinguish between predicting a physical comfort index such as PET and predicting the thermal experience actually reported by people. Evidence from personalized comfort studies indicates that models based solely on environmental variables explain only a limited proportion of subjective comfort ratings, and that their predictive capacity improves substantially when personal and behavioral variables of the occupants are incorporated alongside environmental ones (Haghirad et al., 2024). For Socio Vivienda II, the PET is an appropriate metric if the goal is to compare the thermal performance of different physical configurations of the built environment, as proposed in this study; however, if the aim were to infer the thermal acceptability perceived by residents, it would be necessary to supplement this approach with on-site measurements or surveys that allow for calibrating the relationship between the PET and actual human perception.

Based on this consideration, the present study falls within this line of research, providing specific evidence for a context that is underrepresented in the literature: a social housing settlement in a tropical coastal city in Latin America, where the socioeconomic and climatic conditions

described above converge to underscore the importance of having rapid, computationally inexpensive predictive tools.

In this context, this research aims to develop an ANN capable of predicting thermal comfort levels in urban environments, trained using microclimatic data from simulation programs. Two architectures are compared: the Multilayer Perceptron (MLP), as a feedforward neural network, and the Long Short-Term Memory (LSTM), as a recurrent neural network, in terms of their ability to predict physiologically equivalent temperature (, PET), a key index of thermal comfort. The article presents the methodology used, the results of the comparison between models using various performance metrics, a discussion of the study's strengths and limitations, and conclusions with recommendations for future research.

Predictive Model Configuration

A time series is a sequence of data points separated by regular time intervals. Time series analysis, such as that of the PET bioclimatic index, allows for the extraction of useful features from the time history for predictive models (Barzola-Monteses et al., 2019). In this study, bio-inspired neural networks such as the MLP and the LSTM were considered.

A. Multilayer Perceptron (MLP)

The MLP is a type of feedforward artificial neural network (FFNN) consisting of fully connected neurons with a nonlinear activation function, organized into at least three layers: an input layer, one or more hidden layers, and an output layer. MLPs are characterized by their ability to discriminate data that are not linearly separable. MLPs with a single hidden layer can approximate any continuous function. They have been used in numerous applications, including speech recognition, image recognition, and natural language processing (Barzola-Monteses et al., 2022a).

The learning process in MLPs is carried out via backpropagation, an algorithm originally introduced as an iterative procedure for adjusting the network's weights based on the gradient of the prediction error, and which constitutes a generalization of the least-squares method used in the linear perceptron (Rumelhart et al., 1986).

MLPs are typically applied to supervised learning problems, where they are trained on a set of input-output pairs and learn to model the correlation between them. MLPs are used for a variety of tasks, including classification, regression, and pattern recognition (Barzola-Monteses et al., 2022b).

B. Long Short-Term Memory (LSTM) Model

The LSTM is a type of recurrent neural network (RNN) originally proposed by Hochreiter and Schmidhuber (1997) to overcome the vanishing gradient problem of traditional RNNs. This architecture allows for the learning and maintenance of long-term dependencies in sequential data, making it suitable for various applications such as sentiment analysis, language modeling, speech recognition, video analysis, and time series forecasting, among others (Barzola-Monteses et al., 2020).

LSTMs operate using a memory cell and gates that control the flow of information, allowing them to selectively retain or discard information as needed, thereby avoiding the vanishing gradient problem. The memory cell stores information from previous time steps and uses it to maintain long-term dependencies in the input data. The architecture of an LSTM block typically includes

a memory cell, an input gate, an output gate, and a forget gate, which control the flow of information to and from the cell (Barzola-Monteses et al., 2022b).

This section presents and discusses the experimental setup and the results obtained with the FFNN-MLP and RNN-LSTM models.

A. Experimental Setup

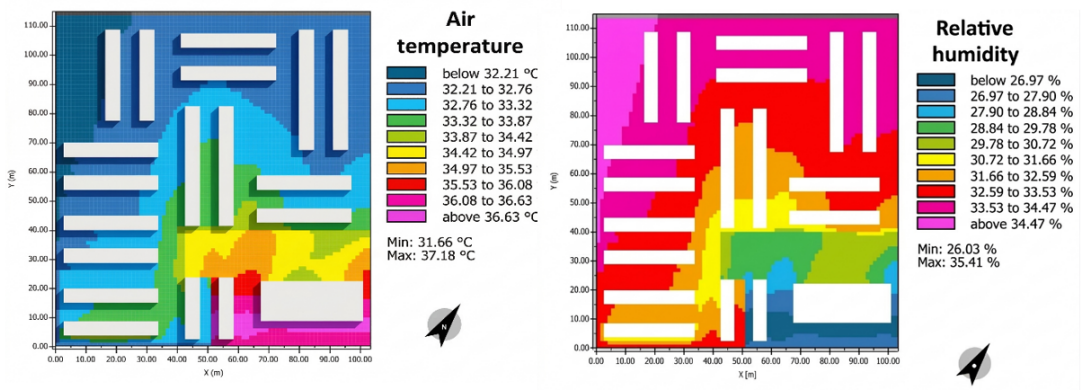
Data: Greater reliability in the input data translates to greater accuracy in the output results. Simulation processes are essential in this research to achieve greater predictive accuracy. The microclimatic conditions of the study site were simulated using ENVI-Met software, which is capable of simulating urban environments and analyzing the interactions between various physical parameters using computational fluid dynamics (CFD). The program provides a wide range of climate data in both two and three dimensions (Ricaurte et al., 2020).

A digital model of the area was developed, consisting of groups of two-story row houses and a four-story building oriented northeast-southwest and northwest-southeast. The geometric characterization of the area including the layout of the buildings, construction materials, building heights, and ground levels was based on the urban-architectural survey of Socio Vivienda II previously reported by Ricaurte et al. (2020). These data, along with the relevant urban geometry parameters, were incorporated into the model for the microclimatic simulation.

Figure 1 depicts the simulated area measuring 99.60 m in the x-direction, 110.40 m in the y-direction, and 30.00 m in the z-direction. The grid resolution is 1.25 m in the horizontal plane and 1.00 m in the z-direction. The simulations were conducted for a typical hot day in a typical year, with a simulation period of 24 hours; however, the model data were collected between 10:00 a.m. and 8:00 p.m.

The simulation data, extracted from the ENVI-met software, included air temperature (T), relative humidity (RH), wind speed (WS), and mean radiant temperature (MRT) at a height of 1.50 m above ground level. Additionally, values for the Sky View Factor (SVF) and simulation time were obtained. Each grid cell, representing public spaces (streets, sidewalks, parks) within the study area, was defined by its XGrid and YGrid coordinates and its Xm and Ym coordinates measured in meters. Subsequently, values for the PET bioclimatic index which measures thermal comfort were obtained for each grid point (EID) (Ricaurte et al., 2020).

Figure 1. Microclimatic simulation of air temperature and relative humidity in the study area performed using ENVI-met.



Note: Prepared by the authors.

B. Model Characteristics and Target Variables

The experimental design addresses a multivariate time-series problem. For the multivariate case, eleven variables are considered that is, eleven regressor variables at the input of the black-box nd one at the output as the prediction variable. In this multivariate case, PET, EID, XGrid, YGrid, Xm, Ym, T, HR, VV, TMR, and FVC are explanatory variables, and PET is retained as the predictor variable.

The training approach used in the models is supervised. The generated samples provided to the model at the input and output have the following structure:

Let an input sample be represented as a matrix, `$X \in R^{T \times f}$`, where `T` is the number of time steps and `f` is the number of features. As mentioned, the number of features is `f=11` for the multivariate case, where each row of the matrix `X` is defined as:

Multivariate case: $x_{[t]} = \left[PET_{[t]}\ EIT_{[t]}\ X_{Grid[t]} Y_{Grid[t]}\ X_{m[t]} Y_{m[t]} T_{[t]} HR_{[t]}\ VV_{[t]} MRT_{[t]} SVF_{[t]}\right]$ (1)

where $t \in 1, \ldots, T$. For each input sample, a target sample is generated, represented by a vector $y \in R^{N \times 1}$, where N represents the number of time steps predicted from T. The target vector represents the actual PET vector, which is given by:

$$y = \left[PET_{[1]},\ \ldots\ , PET_{[n]},\ \ldots\ ,\ PET_{[N]}\right] \quad (2)$$

where $y_{[n]}$ is the actual PET value at time step n , where $n \in 1, \ldots, N$. This target vector is used for comparison with the predicted PET vector, $\hat{y} \in R^{N \times 1}$.

Problem Statement: The one-step prediction model is a forecasting problem that requires predicting the next time step. This is the case considered in this paper. The prediction problem is formulated as follows:

Given the most recent value of the physiologically equivalent temperature (PET) bioclimatic index, what is the expected PET value one step ahead?

C. Data Transformation

Normalization is applied to all variables in the dataset, transforming them to values between -1 and +1. The inputs and outputs are rescaled from one range of values (original values) to a new range of values. Rescaling is typically performed using a linear interpolation formula such as:

$$x' = \frac{(x_i - x_{min})}{(x_{max} - x_{min})}\left(x_{new_max} - x_{new_min}\right) + x_{new_min} \quad (3)$$

where x' is the normalized value, xi is the actual value, xmax and xmin are the maximum and minimum values of the variable, respectively. In this study, xnew_max and xnew_min are +1 and -1, respectively. Equation (3) is referred to as Min-Max normalization, which preserves all relationships among the data (Vafaei et al., 2022).

D. Hyperparameters and Experimental Models

Hyperparameters are parameters that are set before the start of training and control the learning process. They differ from model parameters, which are learned from the data. Examples of hyperparameters include the learning rate, batch size, and the number of hidden layers in a

neural network. Hyperparameter optimization, also known as hyperparameter tuning, involves finding the optimal set of hyperparameters to improve the performance of a machine learning model. This can be achieved using methods such as grid search, random search, and Bayesian optimization.

In this work, grid search was chosen because the hyperparameter space under consideration defined by a small number of discrete combinations for n_input, n_nodes, n_epochs, and n_batch can be exhaustively explored at a manageable computational cost. This avoids the assumptions of continuity or prior distribution required by methods such as Bayesian optimization, although it involves a longer computation time than non-exhaustive search methods.

Based on this configuration, more than 100 models were trained. Using a grid search algorithm, a tuning process was applied to the implemented models by varying the hyperparameters to find the configurations that offer the best generalization on the validation set. The grid search procedure exhaustively considered all combinations of hyperparameters and selected the best subset from among them.

Consequently, the MLP and LSTM architectures specified above were configured. In both cases, configurations with a single hidden layer were considered. Table 1 shows the variation in the hyperparameters used in each of the implemented models.

Table 1. *Hyperparameters considered for the MLP and LSTM models in the experiment*

Hyperparameters	Values
n_input	[50, 100, 500]
n_nodes	[1, 2, 4]
n_epochs	[10, 25, 50]
n_batch	[16, 32]

Note: Created by the author.

In Table 1, n_input is the number of pre-processed inputs to be used as model inputs, n_nodes is the number of nodes/units to be used in the hidden layer, n_epochs is the number of training epochs, and n_batch is the number of samples to be included in each mini-batch, respectively.

Furthermore, due to the stochastic nature of neural networks, each structural configuration is trained and validated ten times during the hyperparameter tuning process. The mean RMSE errors are determined and recorded.

E. Performance Evaluation

Model Evaluation: It is widely known that k-fold cross-validation is not suitable for time-series data, as it ignores their temporal relationships. Therefore, a continuous forecasting method called the Walking Forecasting Model (WFM) is used. This method divides the data into before and after a selected time point and uses each partition for training and validation. Since the objective is to predict the next PET step, this method more accurately reflects the model's expected accuracy under real-world conditions. According to (Bergmeir & Benítez, 2012), each time step in the test set is processed individually and sequentially.

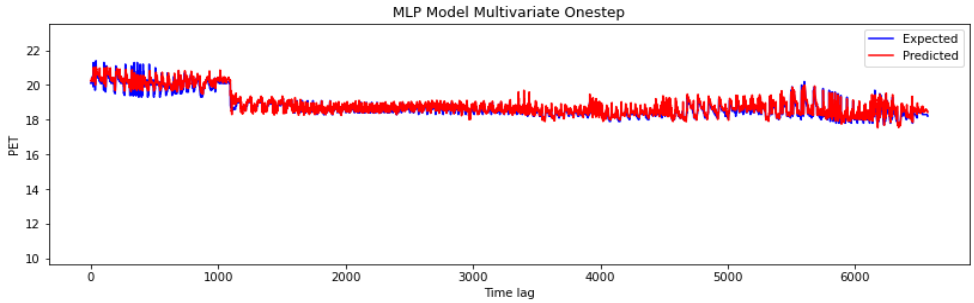
Performance Evaluation: RMSE is considered the primary metric for selecting the best model configuration with the lowest prediction error. Additional supporting metrics include MAE, MAPE, R^2, and CV.

F. Results of the FNN-MLP Experiment

After conducting the experiments and fine-tuning the hyperparameters using the training dataset and validating the WFM on the test set, the best MLP configuration has the following hyperparameters: n_input = 50, n_nodes = 4, n_epochs = 50, n_batch = 32.

Figure 2 shows the predicted PET values for the next step. Consequently, the following prediction errors were obtained: RMSE = 0.195; MAE = 0.138; MAPE = 0.730%; R^2 = 0.916; and CV = 3.613.

Figure 2. Comparison between actual and predicted values using the best MLP configuration model



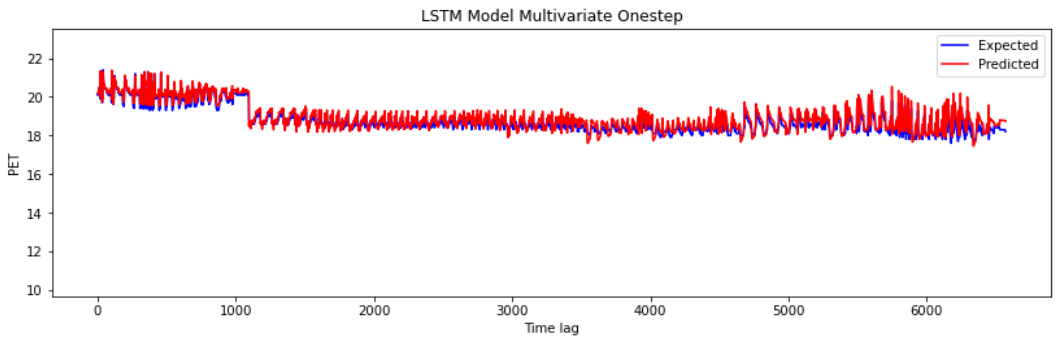
Note: Created by the author.

G. Results of the RNN-LSTM Experiment

As in the experiment conducted with the MLP model configurations, the LSTM models were also trained using all possible combinations of hyperparameters obtained through grid search. The best LSTM configuration has the following hyperparameters: n_input = 500, n_nodes = 1, n_epochs = 50, n_batch = 2.

Figure 3 shows the predicted values for the next PET step. Consequently, the following prediction errors were obtained: RMSE = 0.274; MAE = 0.221; MAPE = 1.183%; R^2 = 0.833; and CV = 3.672.

Figure 3. Comparison between actual and predicted values using the best LSTM configuration model



Note: Created by the author.

H. Comparison of the Evaluated Models

The previous sections presented the results obtained during the experiment with each analyzed model. In particular, the MLP model outperforms the LSTM model with better results.

Furthermore, when applying a grid search to optimize the hyperparameters of both models, it was found that the MLP models are significantly more computationally efficient, with execution times more than seven times shorter than those of the LSTM models. This difference is primarily due to the greater structural complexity of the LSTM architecture.

These findings have direct implications for the practice of bioclimatic urban design. A model capable of estimating the PET index with a root mean square error (RMSE) of 0.195 (less than 0.2 units of the index) based on microclimatic and urban geometry variables such as the Sky View Factor (SVF) allows for a rapid assessment of the likely effect of interventions such as shading, increased vegetation cover, or changes to the aspect ratio between streets and buildings on pedestrian comfort, without the need to run a new full simulation in ENVI-met for each design scenario. This capability is particularly relevant in low-cost housing developments such as Socio Vivienda II, where the population's thermal vulnerability is compounded by limited adaptive capacity (Ramsay et al., 2023) and where mitigation strategies based on vegetation, reflective materials, and optimization of urban geometry have proven to be particularly cost-effective in tropical and coastal climates (Palme and Carrasco, 2022). Thus, a predictive model trained on simulation data could be incorporated into the early planning phases as a tool to rapidly evaluate different scenarios, before conducting more costly physical simulations on the selected design alternatives.

The results obtained are consistent with the trend described in recent literature on machine learning applications to outdoor thermal comfort. Systematic reviews in this field indicate that feedback models such as the MLP, along with ensemble methods such as random forests and support vector machines, frequently demonstrate competitive performance compared to more complex recurrent architectures when predicting PET and UTCI based on meteorological and morphological variables, especially when the volume of available training data is moderate (Mihalakakou et al., 2026). Furthermore, studies comparing different models for predicting outdoor comfort based on urban and environmental parameters have reported that the additional complexity of deeper architectures does not always translate into proportional improvements in accuracy (Pompei et al., 2024). Research aimed at replacing numerical microclimate simulations with machine learning models trained on their outputs also documents substantial reductions in computation time without a significant loss of accuracy (Briegel et al., 2024). This background suggests that, in early urban design workflows where multiple scenarios must be evaluated iteratively, model selection should consider both the error metric and computational cost, as well as the ease of retraining for new scenarios.

The multilayer perceptron model outperformed the long- and short-term memory model in predicting the bioclimatic index and physiologically equivalent temperature. This is consistent with previous research demonstrating the potential of multilayer perceptrons for time series prediction (Roman et al., 2020). The integration of convolutional neural networks and long-short-term memory, as seen in air quality prediction studies (Huang and Kuo, 2018), could further improve the thermal comfort model in future research.

Although the neural network effectively identified the weights and influences of each variable to achieve high-precision predictions, the model's applicability is limited by the nature of the training data. Specifically, the model is tailored to the hot and humid climate of Guayaquil, Ecuador, and to a particular location characterized by two-story semi-detached homes constructed predominantly of concrete. Extending it to other building typologies, urban densities, or climate zones would therefore require retraining with data representative of the new context, since ANNs do not explicitly incorporate the physical knowledge of heat transfer processes that tools such as ENVI-met do model. Recent literature on surrogate models for urban simulations points to a similar limitation: RNA models reliably interpolate within the configurations represented in their training data but do not extrapolate with the same reliability to unrepresented urban forms or extreme weather conditions (Briegel et al., 2024). Furthermore, the training data used in this study come entirely from simulations and not from in-situ measurements. Therefore, the reported accuracy reflects the model's ability to reproduce the simulator's outputs but has not been directly validated against field observations. Complementary validation using data measured at Socio Vivienda II would strengthen confidence in the transferability of the results to real-world operating conditions.

The use of neural networks allows for the extraction of valuable features from time series, enabling the development of accurate predictive models. This is crucial for urban planning and design applications, where understanding the impact of design decisions on thermal comfort is essential. Although this study focused on a specific neighborhood in Ecuador, the methodology can be extended to other urban contexts, providing a flexible and efficient tool for evaluating and optimizing thermal comfort in smart cities (Panchalingam and Chan, 2021).

Finally, Table 2 quantitatively shows the prediction performance metrics of the two models analyzed, confirming that the MLP model achieves the best prediction values. The RMSE is the root mean square error, which represents the distance between the regression line and the data

points. The RMSE quantifies the dispersion of these residuals, revealing the degree to which the observed data cluster around the predicted values (Hyndman and Koehler, 2006). In this study, lower RMSE values indicate greater accuracy in predicting the next PET value; in this case, the MLP outperforms the LSTM model. However, RMSE is sensitive to outliers. Therefore, for a more comprehensive analysis of the forecasting model's performance, MAE, MAPE, R^2, and CV are typically considered as well (Montaño Moreno et al., 2013) (Willmott and Matsuura, 2005).

Table 2. *Forecasting error for each model*

Model	RMSE	MAE	MAPE	R^2	CV	Time
MLP	0.195	0.138	0.73	0.916	3.613	12' 39''
LSTM	0.274	0.221	1,183	0.833	3.672	1h 27' 51''

Note: Prepared by the author.

Conclusions

This research highlights the effectiveness of artificial neural networks in predicting thermal comfort levels in urban environments. Despite their limitations, the models developed offer a faster and more accessible alternative to traditional simulation methods for obtaining reliable predictions. The findings underscore the potential of neural networks as valuable tools for urban planners and designers seeking to assess and optimize thermal comfort in smart cities.

Future research should explore the incorporation of additional data sources, such as satellite imagery and socioeconomic factors, to improve the models' predictive capabilities and generalizability. Furthermore, research on the influence of the built environment on thermal comfort and the effects of climate change could benefit from the findings of this study. The growing availability of urban data, coupled with advances in artificial intelligence, represents a significant opportunity for urban computing to contribute to the development of more comfortable and sustainable urban environments.

In terms of practical application, integrating RNA models trained on microclimatic simulation data into the early stages of urban planning can facilitate the evaluation of strategies for providing shade, increasing vegetation cover, and improving natural ventilation in settlements vulnerable to tropical climates. This would thus contribute to the formulation of urban climate adaptation policies based on quantitative evidence.

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Family Caregivers in Ecuador: A Human Rights Perspective

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Introduction

Care is a fundamental dimension of human existence and a universal need that spans the entire life cycle (Constitutional Court of Ecuador, 2019). In Latin America, and particularly in Ecuador, care work has historically been rendered invisible, feminized, and relegated to the private-family sphere, without legal recognition or adequate social protection (Inter-American Court of Human Rights, 2025). This situation perpetuates structural inequalities based on gender, class, and ethnicity, primarily affecting women, who disproportionately shoulder the responsibilities of caring for children, the elderly, the sick, and people with disabilities (Constitution of the Republic of Ecuador, 2008).

In recent years, the debate on the right to care has gained momentum in Latin America, driven by feminist movements, civil society organizations, and the evolving case law of constitutional courts and international tribunals (National Congress of Ecuador, 2005). This progressive recognition of care as a human right represents a paradigm shift that challenges the traditional social organization of care and demands comprehensive responses from the state, the market, families, and the community (Abramo and Robles, 2021).

Ecuador is at a crucial juncture in this process. The 2008 Constitution incorporated significant advances in the area of rights, including the recognition of unpaid work and shared responsibility for caregiving tasks. However, significant gaps persist between the regulatory framework and the reality faced by caregivers, especially those who provide unpaid family care (Balanta et al., 2024).

This paper is structured into five main sections: (II) the conceptual framework of the right to care from a human rights perspective; (III) the international and regional standards established by the Inter-American Court in OC-31/25; (IV) the jurisprudential development of the Constitutional Court of Ecuador in Case 3-19-JP; (V) the specific situation of family caregivers in Ecuador and the challenges they face; and (VI) the implications for inheritance law as a mechanism for recognizing caregiving work.

Care can be defined as the set of activities essential to meeting the basic needs of dependent persons, whether due to age, illness, or disability (Batthyány, 2015). For decades, care work was considered a natural obligation of women within the domestic sphere, without economic value or social recognition (Bidegain and Calderón, 2018).

The process of conceptualizing care as a human right has been gradual and complex. Authors such as Laura Pautassi have highlighted the transition "from polysemy to the norm," noting how care has evolved from being a vague concept to becoming an enforceable right with specific normative content (Bonilla-Salazar et al., 2024).

The right to care is grounded in multiple instruments of the inter-American human rights system. The American Convention on Human Rights establishes fundamental rights such as life, personal

integrity, equality, and non-discrimination, which form the basis for the recognition of the right to care (Fabiani, 2023).

Likewise, the Inter-American Convention on the Protection of the Human Rights of Older Persons (2015) expressly establishes the right to care for older persons and the obligation of States to design intersectoral public care policies (Garzón-Landínez, 2024).

The way in which care responsibilities are distributed among the state, the market, families, and the community shapes what is known as the "social organization of care" (Henríquez et al., 2024). In Latin America, this organization is characterized by the familialization of care, with families and within them, women bearing the greatest burden of care (Hurtado, 2023); limited commodification, that is, unequal access to paid care services, concentrated among higher-income sectors (Jama et al., 2025); weak state provision, meaning insufficient public care and social protection services for caregivers (Marín, 2023); and finally, informality, since a large portion of paid care work is carried out under informal and precarious conditions (Martínez, 2017).

This structure reproduces and exacerbates gender, socioeconomic, and ethnic-racial inequalities. Women in the region devote between two and five times more time than men to unpaid care work (Membalong, 2022). Women from low-income, Indigenous, and Afro-descendant communities face the heaviest care burdens with the least institutional support (UN Women, 2021).

Inter-American Court Standards: Advisory Opinion OC-31/25

Context and Scope of the Advisory Opinion

On June 12, 2025, the Inter-American Court of Human Rights issued Advisory Opinion OC-31/25, requested by the Argentine Republic, on "The Content and Scope of the Right to Care and Its Interrelation with Other Rights" (Pautassi, 2021). This advisory opinion constitutes a historic milestone in the development of international human rights law, as it is the first ruling by an international court to comprehensively systematize and elaborate on the right to care.

The Inter-American Court of Human Rights was consulted on various aspects, including: - The essential content of the right to care - The obligations of States arising from this right - The interrelationship between the right to care and other human rights - The minimum standards that public care policies must meet - Special protection for vulnerable groups

Essential Content of the Right to Care

The Inter-American Court of Human Rights established that the right to care is an autonomous human right, although it is interrelated with other fundamental rights (Pautassi, 2022). Its essential content includes:

a) Individual dimension: Every person has the right to receive adequate care when needed, as an expression of their human dignity. This right is particularly relevant for children, older adults, people with disabilities, and people with chronic illnesses (Pautassi, 2025).

b) Social dimension: Care must be recognized as a shared social responsibility among the State, the market, families, and the community, moving beyond the traditional conception that relegated it exclusively to the private family sphere (Redrobán and Paredes, 2017).

c) Gender dimension: The right to care involves dismantling gender stereotypes that disproportionately assign caregiving responsibilities to women, recognizing the need to redistribute these tasks equitably (Wanderley, 2019).

d) Economic dimension: Care work, whether paid or unpaid, must be valued, recognized, and accounted for in national accounts as a fundamental contribution to economic and social development.

State Obligations Regarding Care

The Inter-American Court of Human Rights outlined a comprehensive set of state obligations derived from the right to care (Barrera Ortiz et al., 2023):

Obligation to respect: States must refrain from arbitrarily interfering in individuals' caregiving decisions and must not impose disproportionate caregiving burdens based on gender stereotypes (Batthyány et al., 2017).

Obligation to protect: States must adopt measures to prevent third parties (employers, private individuals, institutions) from violating the right to care, including protection against employment discrimination based on caregiving responsibilities (Blofield and Martínez Franzoni, 2015).

Obligation to Ensure: States must: - Establish comprehensive care systems with accessible, high-quality public services (Calderón Magaña, 2013) - Implement equitable and transferable parental leave (Economic Commission for Latin America and the Caribbean, 2022) - Guarantee social protection for unpaid caregivers (Esquivel, 2011) - Promote shared responsibility for caregiving between men and women (Esquivel et al., 2012) - Develop care infrastructure (childcare centers, nursing homes, in-home support services) (Faur, 2014).

Obligation to promote: States must foster cultural changes that transform gender stereotypes associated with caregiving through education, awareness campaigns, and the promotion of shared responsibility in masculinity (National Institute of Statistics and Censuses, 2012).

The Inter-American Court of Human Rights highlighted the interdependence of the right to care with multiple fundamental rights (Marco Navarro, 2007): the right to life and personal integrity, the right to equality and non-discrimination, the right to work, the right to social security, the rights of children and adolescents, the rights of older adults, and the rights of persons with disabilities.

Indicators and Standards for Public Care Policies

The Inter-American Court of Human Rights established that public care policies must meet minimum human rights standards (Razavi and Staab, 2010): there must be sufficient care services and infrastructure throughout the national territory (Rico and Robles, 2016), and care services must be: - Geographically accessible - Economically affordable, with free services or subsidies for lower-income groups - Culturally appropriate and respectful of diversity - Accessible without any discrimination (Rodríguez Enríquez, 2015); care services must meet professional standards, have trained staff, and guarantee dignified conditions for both care recipients and caregivers (Belluscio, 2016); services must respect the preferences, cultural values, and specific needs of service users (Borda, 2017), and care policies require stable and progressive funding, with sufficient budgetary allocations (Larrea Holguín, 2008).

Development of Case Law in Ecuador: Ruling No. 3-19-JP and Related Cases

Judgment No. 3-19-JP and related cases of the Constitutional Court of Ecuador, issued on July 17, 2019, represents a fundamental milestone in the recognition of the right to care with to the Ecuadorian legal system (Medina, 2016). The case arose from multiple protection actions filed by female public-sector workers (under the LOSEP regime) who reported violations of their rights during pregnancy and the breastfeeding period.

The plaintiffs alleged that their employers (public institutions) denied them breastfeeding breaks, subjected them to forced transfers during pregnancy, failed to adapt their working conditions, and, in some cases, terminated their contracts for reasons related to their maternity. These situations highlighted the persistence of employment discrimination based on pregnancy and motherhood, as well as the absence of institutional policies to ensure a balance between work and caregiving responsibilities.

The Constitutional Court conducted a systematic analysis of the right to care in the 2008 Constitution, identifying multiple provisions that recognize and protect it (Ministry of Economic and Social Inclusion, 2021):

Article 66, paragraph 2: Recognizes the right to a dignified life, which includes access to conditions that enable comprehensive care.

Article 69: Establishes the State's special protection of family relationships and the recognition of diverse family forms, including shared responsibility for care (Planifica Ecuador Technical Secretariat, 2021).

Article 325: Recognizes all forms of work, including unpaid subsistence work and human care work performed in the home (Daly and Lewis, 2000).

Article 333: Establishes that the State shall promote shared responsibility and reciprocity between men and women in domestic work and family obligations (Tronto, 1993).

Article 369: Guarantees the social security system for people who perform unpaid work in the home (Williams, 2012).

The Court concluded that a constitutional right to care derives from these provisions, with three fundamental dimensions (Aguirre, 2009):

Right to provide care without discrimination: People may not be discriminated against for assuming caregiving responsibilities, especially in the workplace (Aguirre and Ferrari, 2014).

Right to be cared for: Children, older adults, people with disabilities, and others in situations of dependency have the right to receive adequate care (Aranco et al., 2018).

Right to shared responsibility: Care is not the exclusive responsibility of families or women, but must be shared among the State, the market, families, and the community (Arriagada, 2010).

The Constitutional Court outlined specific obligations of the Ecuadorian State arising from the right to care:

In the workplace: - Guarantee that pregnancy and motherhood are not grounds for discrimination or dismissal (Blofield and Martínez Franzoni, 2014) - Ensure reasonable accommodations in working conditions during pregnancy and breastfeeding (Carrasco et al.,

2011) - Implement effective oversight and enforcement mechanisms for employers who violate the rights of pregnant or breastfeeding workers (Carrasco, 2013) - Promote shared and jointly responsible parental leave (Durán, 2018).

In terms of public policy: - Develop a national care system that coordinates public, private, and community services (Cecchini and Martínez, 2011) - Create accessible, high-quality child care infrastructure (Economic Commission for Latin America and the Caribbean, 2019) - Establish long-term care services for older adults and people with disabilities (Economic Commission for Latin America and the Caribbean, 2020) - Implement training and professionalization programs for care work (Economic Commission for Latin America and the Caribbean, 2021)

In social protection: - Ensure access to social security for people who perform unpaid care work (Chioda, 2016) - Recognize time spent on care for retirement and pension purposes (Del Boca, 2015) - Establish subsidies or cash transfers for families with heavy care burdens (England et al., 2002).

One of the most significant contributions of Ruling 3-19-JP was the development of specific indicators to assess public institutions' compliance with the right to care (Folbre, 2006). The Court established that all public sector entities must implement and report on the following indicators:

Indicator 1: Institutional work-family balance policies Existence of protocols to protect the rights of pregnant and breastfeeding workers Implementation of flexible schedules and telework arrangements Availability of breastfeeding rooms in the workplace (Adelman et al., 2014).

Indicator 2: Childcare infrastructure Number and coverage of early childhood development centers in public institutions Accessibility and quality of childcare services for workers' children (Bauer and Sousa-Poza, 2015).

Indicator 3: Training and Awareness-Raising - Training programs on care rights and shared responsibility - Campaigns to prevent discrimination based on pregnancy and motherhood (Brodaty and Donkin, 2009).

Indicator 4: Labor Force Participation Free of Discrimination - Percentage of women in management and decision-making positions - Gender pay gaps - Cases of workplace discrimination based on pregnancy or caregiving responsibilities (Carretero et al., 2009).

Indicator 5: Use of Leave and Permissions - Percentage of paternity leave actually taken - Gender distribution of the use of caregiving leave (Coe and Van Houtven, 2009).

The Constitutional Court did not limit itself to resolving individual cases but adopted structural remedies to transform institutional practices (Pinquart and Sörensen, 2003). It ordered:

The Ministry of Labor: To develop a national protocol for the protection of the labor rights of pregnant and breastfeeding women (Schulz and Sherwood, 2008).

The Ministry of Economic and Social Inclusion: To expand the coverage of child care services (Esquivel, 2012).

All public institutions: To implement public policy indicators for care and report annually on their compliance (Folbre, 2001).

To the Ombudsman's Office: To follow up on and monitor compliance with the ruling (Himmelweit, 2007).

Family caregivers in Ecuador constitute a heterogeneous but predominantly female group. According to the National Time Use Survey (2012), Ecuadorian women devote an average of 31.6 hours per week to unpaid care work, wh , men devote just 9.1 hours (Pérez Orozco, 2014). This gender gap in caregiving has profound implications for women's economic autonomy, social and political participation, and well-being.

Sociodemographic Profile: - Age: Women between the ages of 35 and 60 predominate, although there is also a significant number of older women who care for other older adults or grandchildren (Picchio, 2001) - Educational level: Mostly primary education or incomplete secondary education (Razavi, 2007) - Economic status: Middle- and low-income sectors, with a high incidence of poverty (Rodríguez Enríquez and Marzonetto, 2015) - Geographic area: Both urban and rural, with specific characteristics depending on the context.

Types of care: - Child care: Children under 5 years of age - Care for older adults: Especially those with functional dependence - Care for people with disabilities: All ages - Care for people with chronic or terminal illnesses.

Unpaid family caregiving has multiple impacts on caregivers:

Economic impacts: - Reduced or discontinued participation in the formal labor market (Díez-Picazo and Gullón, 2012) - Lower income and greater economic dependence - Lack of social security contributions and reduced access to pensions (Kemelmajer de Carlucci, 2014) - Impoverishment in old age (Lathrop Gómez, 2008).

Health impacts: - Physical and emotional overload ("caregiver syndrome") (Medina, 2014) - Higher prevalence of chronic diseases (hypertension, diabetes, musculoskeletal problems) (Lohmann, 2015) - Mental health problems (depression, anxiety, chronic stress) - Reduced access to health services due to lack of time (Domínguez Águila and Domínguez Benavente, 2011).

Social impacts: - Social isolation and a reduction in support networks (Ferrer Vanrell, 2010) - Limited community and political participation - Restricted educational and personal development opportunities.

Impacts on rights: - Violation of the right to work in decent conditions (Lacruz Berdejo, 2009) - Limitation of the right to education and professional development - Impact on the right to health and rest - Restriction of the right to social and political participation.

Despite constitutional and jurisprudential advances, significant gaps persist in the protection of family caregivers in Ecuador, as in other Latin American countries (Abramovich and Courtis, 2002):

Regulatory gap: - Absence of a specific care law to implement the constitutional framework (Alexy, 2007) - Limited regulation of family caregivers' rights in the Labor Code (Ávila Santamaría, 2011) - Insufficient recognition within the social security system (Carbonell, 2003).

Service gap: - Absence of public long-term care services for older adults (Ferrajoli, 2011) - Limited home-based support programs for people with disabilities (Pisarello, 2007) - Lack of respite services for caregivers (Storini and Navas Alvear, 2013).

Social protection gap: - The percentage of unpaid family caregivers, according to the occupational category reported in the Permanent Household Survey (EPH), is 0.8% among households receiving the universal child allowance in Argentina (Bertranou, 2010). - There is no recognition of caregiving time for retirement purposes (Busso and Messina, 2020) - Absence of specific cash transfers for caregivers (Cecchini et al., 2015).

Budgetary gap: - Public investment in care accounts for less than 0.5% of GDP (Filgueira, 2013). - Insufficient resources to expand service coverage (Huber and Stephens, 2012). - Lack of budgetary prioritization for care policies (Mesa-Lago, 2004).

The situation of family caregivers is exacerbated when multiple axes of inequality intersect (Rofman, Apella, and Vezza, 2015):

Indigenous and Afro-Ecuadorian women: - Face heavier care burdens due to having more children and the presence of extended families (Berriel and Pérez, 2016) - Have less access to public care services in rural and outlying areas (Cafagna et al., 2019) - Language and cultural barriers to accessing support programs - Higher incidence of poverty and social exclusion (Huenchuan, 2018).

Migrant women: - Global care chains: Ecuadorian women who migrate to provide care in other countries, leaving their own children in the care of other female relatives - Caregivers for returning migrants with care needs (Rodríguez Cabrero, 2011) - Limitations on access to transnational social protection (Angelino and Rosato, 2009).

Older caregivers: - Women aged 60 or older who care for partners, siblings, or other older relatives (Barnes and Mercer, 2010) - "Grandmother caregivers" who take on the care of grandchildren due to migration or complex family situations (Ferreira, 2010) - Double vulnerability: they need care themselves, yet continue to provide it (Palacios, 2008).

Male caregivers: - Although they are in the minority, they face social stigma and a lack of recognition (Palacios and Romañach, 2006) - Less access to support networks among caregivers (Shakespeare, 2013) - Difficulties balancing work and caregiving due to traditional expectations of male roles (Araujo et al., 2013).

The narratives of family caregivers reveal the emotional, ethical, and practical complexity of caregiving (Berlinski and Schady, 2015). Testimonies gathered in various studies show:

Love and obligation: Family caregiving is experienced as an expression of love and solidarity, but also as a moral and social obligation, especially for women (Castañeda and Aldaz-Carroll, 1999).

Satisfaction and burden: Feelings of satisfaction from caring for a loved one coexist with physical and emotional exhaustion (Nores and Barnett, 2010).

Loneliness and lack of understanding: Many caregivers feel that their work is neither valued nor understood by family members or by society (Salvador, 2015).

Demands for recognition: They call on the government to recognize their contribution and provide concrete support (Ariza, 2011).

Inheritance law governs the transfer of assets, rights, and obligations from a deceased person to their heirs. Traditionally, this law has been based on the freedom to make a will and on the protection of the family as the social unit (Herrera, 2013).

However, from a contemporary human rights perspective, inheritance law must also serve the function of redistributive justice and recognition of contributions (Parella and Cavalcanti, 2006). In this sense, it can serve as a mechanism to:

- Recognize and compensate for unpaid family care work (Pedone, 2006).
- Correct economic inequalities stemming from the gendered division of labor (Yeates, 2012).

- Protect people who sacrificed employment and economic opportunities to provide family care (Blofield, 2012).
- Ensure economic security in old age for caregivers (Chaney and García Castro, 1989).

The Ecuadorian Civil Code regulates inheritance by distinguishing between intestate succession (without a will) and testamentary succession (with a will) (Goldsmith, 2007). In both cases, there are mandatory heirs who are entitled to a portion of the estate (legitimate share) that the testator cannot disinherit (International Labor Organization, 2013).

Order of intestate succession: 1. Descendants (children, grandchildren) 2. Ascendants (parents, grandparents) 3. Spouse or domestic partner 4. Siblings 5. Other collateral relatives up to the sixth degree 6. The Ecuadorian State (Valenzuela and Mora, 2009).

Current limitations: The current inheritance framework has limitations when it comes to recognizing family caregiving (Aguirre et al., 2005).

It does not expressly consider caregiving as a relevant factor in the distribution of an estate (Durán, 2007).

Formal equality among heirs can result in material inequality when some have shouldered disproportionate caregiving burdens (Gálvez Muñoz and Rodríguez Modroño, 2011).

It does not recognize inheritance rights for individuals who, without being immediate family members, provided long-term care (National Institute of Statistics and Censuses, 2012).

Various Latin American authors have proposed reforms to inheritance law to incorporate recognition of caregiving work (Milosavljevic and Tacla, 2007). Some proposals include:

a) Increased spousal share for caregiving: Granting the spouse or domestic partner who assumed caregiving responsibilities a larger share of the estate as compensation for the unpaid work performed and the economic opportunities sacrificed (Barba Solano, 2004).

b) Bequest for caregiving services: Allow the testator to establish specific bequests in favor of individuals (whether family members or not) who provided care, with special protection ensuring that these bequests cannot be easily reduced (Draibe and Riesco, 2011).

c) Right of residence for caregivers: Guarantee the right to lifetime residence in the family home for the spouse or family member who was the primary caregiver, especially when they have no other financial resources (Filgueira et al., 2011).

d) Financial compensation for care: Establish a mechanism for financial compensation, paid from the estate, for individuals who provided long-term care, calculated based on the time dedicated and lost economic opportunities (Martínez Franzoni, 2008).

e) Recognition of non-family caregivers: Expand inheritance rights to include individuals who, although not related by blood, provided significant care to the deceased (Martínez Franzoni and Sánchez-Ancochea, 2016).

Some Latin American countries have begun to incorporate recognition of caregiving into their inheritance systems (Committee on the Elimination of Discrimination against Women, 2013):

Argentina: The Civil and Commercial Code (2015) introduced the concept of "financial compensation" in cases of divorce, which considers dedication to the care of children and the household as a factor in determining compensation (Inter-American Convention on the

Prevention, Punishment, and Eradication of Violence against Women, 1994). Although not specifically related to inheritance, this sets a precedent for the financial recognition of caregiving.

Uruguay: It has developed a comprehensive care system that includes recognition of caregivers' rights in various areas, including social protection that could have financial implications (Convention on the Elimination of All Forms of Discrimination against Women, 1979).

Colombia: Constitutional case law has recognized the right of caregivers of people with disabilities to receive financial compensation and special protection (Facio and Fries, 2005).

Incorporating the recognition of care into inheritance law faces several challenges (Lagarde, 2005):

Technical and legal challenges: - Determining objective criteria for measuring and valuing care work (Gilligan, 1982) - Establishing mechanisms to prove that care was provided (Held, 2006) - Balancing the recognition of care with the rights of other heirs (Kittay, 1999) - Preventing family conflicts and inheritance disputes (Noddings, 2002).

Cultural challenges: - Resistance to "monetizing" family care (Sevenhuijsen, 1998) - Tensions between traditional conceptions of family and new realities of care (Tronto, 2013) - Risk of reinforcing gender stereotypes if only female caregiving is recognized (Uruguayan Law on the National Integrated Care System, 2015).

Equity challenges: - Ensuring that recognition does not benefit only families with significant wealth (Civil and Commercial Code of the Argentine Nation, 2014) - Coordinating inheritance recognition with social protection systems for all caregivers (Inter-American Convention on the Protection of the Human Rights of Older Persons, 2015)

Conclusions

The recognition of the right to care as a human right represents a paradigm shift in the understanding of social and state responsibilities in the face of a universal human need. The legal and jurisprudential developments analyzed particularly Advisory Opinion OC-31/25 of the Inter-American Court and Ruling 3-19-JP of the Constitutional Court of Ecuador establish clear standards regarding the content, scope, and obligations arising from this right.

Among the main findings is the recognition of care as a multidimensional right. The right to care encompasses the right to care for others, to be cared for, to self-care, and to work in care under dignified conditions. This multidimensionality requires comprehensive responses from multiple areas of law.

Furthermore, there are comprehensive state obligations. States have obligations to respect, protect, guarantee, and promote the right to care, which entails developing comprehensive care systems, ensuring social protection for caregivers, and transforming discriminatory cultural patterns.

Furthermore, the interrelationship with other rights. The right to care is indispensable for the effective realization of other fundamental rights, especially the rights of women, children, older adults, and people with disabilities.

Persistent Gaps in Ecuador: Despite constitutional and jurisprudential advances, significant gaps remain in legislation, services, social protection, and budgeting that limit the effective exercise of the right to care.

Similarly, the disproportionate impacts on women were evident. The social organization of care in Ecuador perpetuates gender inequalities, affecting the economic autonomy, health, and social and political participation of women caregivers.

Furthermore, inequalities in care are exacerbated when they intersect with other forms of discrimination (ethnicity, class, age, immigration status), particularly affecting Indigenous women, Afro-Ecuadorian women, migrant women, and older women.

Furthermore, inheritance law can serve as a complementary mechanism to recognize and compensate for family caregiving work, although it requires legislative reforms and faces implementation challenges.

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Intelligent System for University Space Management: Monitoring, Prediction, and Resource Optimization

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Introduction

Currently, the efficient management of event spaces is a key challenge for educational institutions, especially those with a high demand for academic and extracurricular activities such as academic events, international conferences, scientific forums, and graduation ceremonies. The Bolivarian University of Ecuador faces difficulties in managing its spaces, which leads to scheduling conflicts, inefficient use of resources, and various logistical challenges for students and faculty. The central conflict stems from the tension between a 21st-century university community which demands flexibility and immediate access to information and an administrative structure rooted in a rigid, reactive, and non-transparent management model. This problem manifests itself at the critical bottleneck of the reservation system: the point where static planning collides with the dynamic reality of , creating an information gap that the current system is unable to manage. This bottleneck is the source of the entire chain of inefficiencies, characterized by manual reservation processes based on spreadsheets and emails that are slow and prone to double bookings. Furthermore, the lack of technology to determine whether a reserved space is actually being used perpetuates the false perception of scarcity and generates unnecessary energy and climate control costs for "ghost classrooms." In response to this problem, we present Smart Event Space Management, a solution designed to optimize the planning and allocation of infrastructure. This research seeks to determine the impact of the current manual management system on the institution's operational efficiency. The overall objective is to develop an application that optimizes the planning, booking, and administration of spaces, enabling efficient, accessible, and transparent management. By digitizing these processes, the institution will be able to adapt to current trends in smart management and innovation, integrating new tools into its digital ecosystem.

Theoretical Framework and Problem Statement in Space Management

The management of higher education institutions faces increasing complexity, where operational efficiency and the student experience are key determinants of their competitiveness. In this context, space management has evolved from a purely logistical task to a strategic discipline. This research is framed within a theoretical structure that encompasses university digital transformation and the concept of the "Smart Campus" (Vega León et al., 2021). Dong et al. (2020) define the Smart Campus as an ecosystem that integrates infrastructure, technologies, and services to meet the needs of the university community. When applying the lessons of smart cities to the campus, technology must be integrated with the actual processes and needs of its users, rather than treated as an end in itself (Gascó-Hernández, 2018). Universities possess vast infrastructure assets (classrooms, laboratories, auditoriums) whose value lies in their effective use.

The literature on facilities management and smart campuses indicates that data fragmentation makes it difficult to convert operational records into useful information for making decisions about physical resources (Ahmed et al., 2017; Min-Allah and Alrashed, 2020). Historically, the allocation of university spaces has relied on methods dependent on human intervention. In a case study conducted on a real university campus, Sutjarittham et al. (2019) equipped nine classrooms with sensors and collected data from more than 250 courses over two semesters. Their results showed that the discrepancy between enrollment and actual attendance can lead to underutilization; therefore, they combined IoT sensors, attendance prediction, and dynamic allocation to reduce wasted space. The qualitative leap comes with Intelligent Space Management Systems, which centralize inventory in a single source of truth, automate online reservations through self-service portals, and analyze usage data to generate utilization rate reports (Min-Allah and Alrashed, 2020). Internationally, Chintala et al. (2024) analyzed historical occupancy data from three study spaces at University College London and developed machine learning models to estimate future usage patterns and recommend study areas. This prior research supports the use of occupancy and prediction data to aid space management, though it does not establish a generalizable percentage of improvement in classroom utilization. To implement this solution in an innovative way, a technological architecture has been designed that goes beyond simple digitization by incorporating a predictive algorithmic core. The term "smart" in this context refers to the application of artificial intelligence techniques to analyze historical data, predict future demand, and automate resource allocation, transforming management from reactive to proactive (Breiman, 2001; Dong et al., 2020). For this purpose, the Random Forest machine learning algorithm was selected. This ensemble-based supervised learning algorithm works by constructing a multitude of decision trees during training and generating the class that represents the mode of the individual predictions. Its strength lies in its ability to correct the overfitting to which individual decision trees are prone. In a comparative analysis with other leading models such as XGBoost and Support Vector Machines (SVM), Random Forest stood out for offering an optimal balance between high performance, training speed, and moderate interpretability. The ability to extract variable importance is fundamental to this project, as it will allow administrators to understand which factors (courses, schedules, days) most influence demand for spaces. In terms of software architecture, the web application requires a robust and scalable development environment; to this end, Symfony was implemented a high-performance PHP framework based on the Model-View-Controller (MVC) pattern, integrating efficient template engines (The PHP Group, 2024; Potencier, 2024). Compared to alternatives such as Laravel or Laminas, Symfony was chosen for its architecture based on decoupled components and its suitability for complex, long-term projects. Its stability and long-term support guarantee the technical maintainability of the university system. Regarding data persistence and structuring, information on spaces, users, and schedules requires secure and consistent storage managed through efficient database tools (DBeaver Corp., 2024); therefore, MySQL was implemented as the database management system. The nature of the project's data is highly structured and relational, since a classroom belongs to a building and a reservation is inextricably linked to a user. The combination of MySQL, its excellent performance in read operations, and the ACID compliance of its InnoDB engine make it the most reliable and lowest-risk option for a transactional web application of this scale.

Digital transformation in higher education must be understood as an institutional change that integrates processes, people, data, and technology not merely as the replacement of manual procedures with electronic forms. The systematic review by Castro Benavides et al. (2020) shows that this process encompasses teaching, administration, infrastructure, and decision-making, and

requires interoperability between systems and organizational capabilities to utilize data. When applied to space management, this involves connecting the physical inventory, academic calendars, reservations, and occupancy records into a single workflow. This integration allows the information generated by day-to-day operations to serve as input for institutional planning, while also making allocation rules and the responsibilities of stakeholders transparent. Consequently, the digitization of reservations constitutes an initial step; the transformation occurs when historical and real-time data guide decisions regarding infrastructure availability, maintenance, and expansion.

From this perspective, the concept of the Smart Campus provides the framework that links infrastructure, enabling technologies, and university services. Dong et al. (2020) propose a people-centered, learning-oriented smart campus, organized into layers of infrastructure, technology, and services. This definition avoids reducing campus intelligence to the mere presence of sensors or isolated applications: a service is intelligent when it uses contextual information to respond to the needs of students, faculty, administrative staff, and university officials. In the Ecuadorian context, Vega León et al. (2021) also conceive of the smart university as an integration of resources, processes, and services supported by digital technologies. For the issue addressed in this chapter, space management lies at the intersection of the physical layer and the service layer, as it translates information on capacity, equipment, schedules, and demand into operational decisions that affect the academic experience and the sustainable use of the campus.

Smart space management requires distinguishing three related functions: monitoring, predicting, and allocating. Monitoring describes the observed state of each space; prediction estimates its future demand or occupancy; and allocation applies rules and constraints to recommend an available option. Recent literature on resource management in connected campuses highlights that the value of the Internet of Things depends on integrating heterogeneous data and converting it into useful information for institutional services (Li et al., 2025). In this regard, a recorded reservation does not necessarily equate to actual occupancy. Therefore, the system must correlate the intended use expressed in the reservation with subsequent evidence of attendance or presence. This distinction allows for the calculation of more precise indicators, such as scheduled utilization, actual utilization, cancellations, and unused reserved spaces. It also provides a more solid basis for comparing academic units and adjusting policies regarding the release or reassignment of spaces.

The Internet of Things provides the necessary observation layer to update the status of spaces more frequently than administrative records. A campus architecture can combine sensors for presence, energy consumption, or environmental conditions with communication and processing services at the edge or in the cloud. Fraga-Lamas et al. (2019) demonstrated the feasibility of a LoRaWAN and fog computing architecture for smart campus applications, illustrating how to capture and process distributed information without relying exclusively on manual records. In space management, these readings can confirm occupancy, detect discrepancies between reservations and actual use, and trigger operational alerts. However, implementing this approach requires defining policies regarding data quality, synchronization, and retention, as well as limiting data collection to only the necessary information. The usefulness of monitoring depends on the reliability of the sensors and on clear rules for resolving missing, duplicate, or contradictory readings.

Predictive analytics complements monitoring by estimating future patterns based on historical records. Random Forest combines multiple decision trees built on samples and subsets of

variables, and aggregates their results to reduce the variability of an individual tree (Breiman, 2001). In this project, its use is relevant because temporal, academic, and physical variables may have nonlinear relationships and exhibit interactions that are difficult to represent using fixed rules. However, prediction and optimization serve distinct functions. The model can estimate the probability of use or the expected occupancy level; the final recommendation must incorporate operational constraints, such as capacity, equipment, availability, and the absence of overlaps. This separation improves the system's traceability: the predictive component anticipates demand, while the allocation component applies institutional criteria to select a feasible alternative. The model's utility must be evaluated against a baseline and using data not used in training, so that the reported accuracy reflects its generalization ability.

To operationalize the predictive model, it was essential to rigorously define the study variables extracted from historical records. The following were established as predictor (independent) variables: the unique identifier of the space, installed capacity, infrastructure category (classroom, laboratory, or auditorium), day of the week, time slot, and demand level for the requested degree program. The target (dependent) variable was defined as the projected occupancy level. The working hypothesis posits that there is a nonlinear, multifactorial relationship between these architectural and temporal variables, and that the machine learning algorithm is capable of decoding this complexity to anticipate the logistical behavior with high precision. Additionally, to ensure the quality of the data input into the Random Forest model, an ETL (Extract, Transform, Load) workflow was structured to include the removal of duplicate records, imputation of missing values, feature engineering using one-hot encoding for categorical variables, and a stratified split of 80% for training and 20% for testing (McKinney, 2010; The pandas development team, 2024).

Technological Implementation

Following the deployment of the Intelligent Space Management System, quantitative and qualitative findings validated the success of the proposal at the technical and operational levels. In terms of accessibility and performance, the platform demonstrated 100% technical compatibility with modern web browsers on desktop computers and tablets. Task success tests revealed that 100% of users were able to check availability and successfully complete reservations in desktop environments. On mobile devices, the success rate was 98% for availability checks and 94% for reservation confirmations; the slight margin of error was attributed to user interactions with date fields on small screens and to latency on low-speed networks. The system's predictive core, powered by a Random Forest algorithm trained on two years of academic data, demonstrated outstanding algorithmic efficiency. The model achieved 91.5% accuracy in predicting the probability of effective use of a reserved space, processing complex allocation recommendations for all campus spaces in an average time of just 58 seconds. At the Human-Computer Interaction (HCI) level, the development delivered an ecosystem of interfaces designed to optimize the user experience. The main request interface allows the academic community to define exact parameters such as the required seating capacity and specific technological equipment (projectors, smart boards, climate control). Based on these parameters, the Artificial Intelligence component processes the request and displays a booking suggestion window, recommending the most suitable space that meets the requested criteria, while ruling out from the outset any alternatives that do not comply with capacity, equipment, or availability restrictions. This recommendation logic is consistent with the approaches to classroom prediction and dynamic allocation described by Sutjarittham et al. (2019). For administrators

and management staff, a Data Visualization and Control Dashboard was implemented, transforming static administration into dynamic monitoring. This control center centralizes key performance indicators (KPIs) in real time, detailing available versus occupied rooms, the average monthly usage percentage, and a visual analysis of trends through pie charts showing the infrastructure resources most in demand by the community. Qualitative validation of these technological implementations, obtained through stratification of the pilot group, revealed an exceptionally positive reception. On a rating scale of 1 to 10, the overall satisfaction metric achieved an average score of 8.93, with a low standard deviation of 0.88, indicating strong consensus and consistency in the responses from the teaching and administrative community. The data distribution revealed that ratings were concentrated among the highest scores, with a rating of "9" being the statistical mode of the study, and no negative operational perceptions were recorded.

To ensure the irrefutability of these technical deliverables, the proposal underwent rigorous scrutiny through an expert review, complementing the automated performance metrics. This external validation was carried out through an evaluation by a specialist with extensive track record in implementing enterprise technology solutions and a formal audit by a corporation focused on the development and export of services. The evaluation tools designed for this expert panel focused on assessing the system's relevance to the real needs of the education market, the level of algorithmic innovation, the viability of the proposed Symfony architecture, and the scalability of the data model to support future population growth. The consensus of this external audit not only certified the robustness of the code and the usability of the graphical interfaces but also validated the high Return on Investment (ROI) that the university would achieve by migrating to this Smart Campus model, empirically supporting the platform's viability prior to its mass deployment.

Finally, the generation of consolidated reports by department went from requiring 4 hours of manual work to just 7 seconds using the automated module.

Impact of Smart Management

Analysis of the empirical results shows that the digitization and automation of the infrastructure made it possible to reduce logistical inefficiencies and improve the institution's operational capacity. The most immediate and measurable impact was observed in transactional efficiency: the average time required to process a reservation from login to final confirmation in the automated system was reduced to 1 minute and 28 seconds. This indicator contrasts with the 12 minutes required by the decentralized manual process and demonstrates an improvement in administrative agility. The observed reduction supports the expectation of time savings, although the return on investment will need to be quantified through a specific economic analysis. The predictive model's level of effectiveness had a direct impact on the utilization of the university's physical capital. Before the technological intervention, the analog management system revealed underutilization of resources, with an effective utilization rate of just 55%. Following the deployment of the algorithm and the centralized management of confirmations, the effective utilization of classrooms and auditoriums rose to 82%. This increase indicates improved utilization and suggests that centralized control helped reduce unused reservations. Without continuous physical measurement, the results do not allow us to conclude that "ghost classrooms" were completely eliminated. Additionally, the smart ecosystem substantially reduced schedule overlaps, one of the main problems with the manual process. The comparative analysis revealed that the institution experienced an average of 14 booking conflicts per week

due to human errors in manual allocation. With the logical rules of the new database and predictive automation, this rate was reduced to an average of 1 conflict per week, which was traced to a manual intervention outside the software's standardized workflow. The analytical capability to support management was another significant outcome. The unified collection of metadata enabled the automated generation of occupancy reports and institutional usage trends. Document consolidation tasks that previously required an estimated 4 hours of manual labor and data cross-checking by coordinators are now synthesized and exported by the algorithmic module in just 7 seconds. The system's strategic impact includes supporting institutional decision-making through consolidated information. The relational structuring of the information enabled an analysis of demand by type of space. Metadata extracted from the platform revealed that the institution's greatest operational burden does not lie in standard classrooms which accounted for 17.24% of demand but rather in high-use and specialized spaces, notably auditoriums, which accounted for 34.48% of reservations, and meeting rooms, which accounted for 22.41%. This characterization of the demand provides the board of directors with evidence to inform budget planning. Thus, future investments in infrastructure expansion or campus remodeling can be directed toward the types of spaces with the highest projected demand, provided that these projections are aligned with academic, budgetary, and accessibility criteria.

The utilization results should be interpreted as evidence of performance within the context of the pilot and not as a direct equivalent to the percentages reported by other campuses. The increase from 55% to 82% represents 27 percentage points and a relative increase of 49.1% compared to the baseline. This trend aligns with the framework described by Dong et al. (2020), according to which a Smart Campus integrates infrastructure, technology, and services to meet the needs of its stakeholders, and with the work of Chintala et al. (2024), which uses IoT data and machine learning to improve the use of study spaces at University College London. However, both of these studies use different contexts, time periods, and definitions of utilization; therefore, the 82% figure obtained should not be presented as superior or directly comparable. Its value lies in demonstrating that centralizing reservations and estimating demand can address the underutilization observed within the institution under study.

The reduction from 14 to 1 weekly conflict equates to a 92.9% decrease, while the booking time dropped from 12 minutes to 1 minute and 28 seconds an approximate reduction of 87.8%. These metrics expand upon the standard analysis of the Smart Campus which typically focuses on sensors, connectivity, and utilization because they also allow for an examination of the service's administrative burden. Dong et al. (2020) argue that the IoT can automate operations and reduce routine management tasks. The results of this study are consistent with that expectation, although the effect cannot be attributed exclusively to the Random Forest model: the centralized database, the anti-overlap rules, and the self-service interface also contributed to the improvement. This distinction prevents confusion between the accuracy of the predictive component and the overall performance of the platform.

Regarding "ghost classrooms," the available evidence confirms a reduction in unused reservations based on the confirmations recorded by the platform, but not continuous physical detection of occupancy. This difference is significant when compared to international IoT-based architectures. Fraga-Lamas et al. (2019) validated a LoRaWAN architecture with distributed processing for smart campus applications, while Li et al. (2025) review the management of university resource information using IoT. Consequently, the developed system represents an intermediate stage: it combines administrative records and prediction, but still requires presence

sensors or equivalent sources to verify in real time whether a reservation is actually used. Therefore, the observed prevention should be interpreted as an operational effect of reservation control and not as an automated measurement of physical occupancy.

The contribution of this case study lies in the integration of indicators that are typically analyzed separately: effective utilization, conflicts, processing time, and report generation. This integration addresses the challenge identified by Ahmed et al. (2017) regarding the imbalance between collecting data and converting it into useful analytics for facility management. However, validation was conducted within a specific institutional setting and during a pilot period; furthermore, improvements were compared to a historical baseline, without a concurrent control group. Consequently, the results support the operational feasibility of the solution at the Bolivarian University of Ecuador, but do not allow for the automatic generalization of the 82% occupancy rate or the reduction in conflicts to other universities. Replication at other campuses, with standardized definitions of occupancy and longer observation periods, will help determine which effects are consistent and which depend on the context.

Conclusion

The development and implementation of the Intelligent Space Management System at the Bolivarian University of Ecuador fulfilled the overall objective of implementing a predictive, functional, and accessible web platform to support the allocation of physical infrastructure. The main operational result was a 27-percentage-point increase in effective utilization, rising from 55% to 82% validated occupancy. This indicator shows an improvement within the context of the pilot and supports continued evaluation before extending the solution to other campuses. The software architecture and algorithmic core performed satisfactorily during the tests conducted. During the pilot validation period, the platform processed 290 corporate and academic reservations without any system crashes or database availability errors; conflicts were reduced to an average of one per week, attributable to a manual intervention outside the standardized workflow. The average time required to reserve a space was reduced from 12 minutes in the manual process to 1 minute and 28 seconds on the platform. This result indicates a potential operational savings that will need to be quantified through a specific economic analysis. The university community's acceptance of the technology was favorable during the pilot. Ninety-three percent of users endorsed the information architecture, rating the interface as highly intuitive, and 100% of surveyed staff stated their intention to adopt this tool into their daily workflow. From a business intelligence perspective, the relational structuring of the data made it possible to characterize infrastructure demand and revealed that the university's greatest operational burden lies not in standard classrooms (17.24%), but in lecture halls (34.48%) and meeting rooms (22.41%). This metadata provides the board of directors with additional evidence for budget planning and the university's future physical expansion. It is recommended to evaluate the project's scalability through a gradual expansion to other departments and campuses, accompanied by comparable performance indicators. Likewise, the technology roadmap should prioritize the integration of asynchronous notification engines via institutional messaging to automate reminders and reduce absenteeism. As the next step, it is proposed to integrate the software with physical presence sensor hardware and computer vision algorithms to verify occupancy in real time and, in a controlled manner, release reserved spaces that are not actually used.

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Contributions of Shrimp, Oil, Mining, and Remittances to the Growth of the Ecuadorian Economy

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Introduction

In recent years, the Ecuadorian economy has been driven by a rebound in foreign trade and international financial transactions (remittances). In the post-pandemic years (2021–2025), there has been significant growth in exports. Historically, the country has been an agricultural exporter, with flagship products such as shrimp, bananas, tuna and canned fish, fresh flowers, cocoa, and coffee, among others. Natural (geographical) conditions and the industry's competitive advantage have enabled exports to remain a major driver of the economy. Likewise, the oil and mining industries (lead and copper concentrates, other mining products, and gold) generate foreign exchange for the country, with oil playing a stronger role given that mining is a relatively new industry in Ecuador. These exportable goods account for nearly 83% of the country's total exports (Central Bank of Ecuador, 2025a).

Since 2017, Ecuador has outlined a trade policy that is more open to the world as a strategic objective for a national development plan, in which the country's economic policy priority has been to foster closer ties for the signing of trade agreements with countries in the Americas and other continents. According to the Ministry of Production, Trade, and Investment, agreements with El Salvador and Nicaragua entered into force in 2017. In 2018, an agreement was signed with the European Free Trade Association (comprising Iceland, Liechtenstein, Norway, and Switzerland). In 2019, a trade agreement was signed with the United Kingdom. This process was significant because the UK had implemented Brexit (its exit from the European Union), and Ecuador had to reach a new agreement with the UK that would allow it to trade with reduced tariffs on products for the coming years so as not to lose the market it had previously gained (Ministry of Production, 2026).

Following the COVID-19 pandemic, Ecuador began exploring Asian markets in light of the economic boom in those nations. By 2024, Ecuador had a trade agreement in place with the People's Republic of China; the priority given to this agreement with the Asian nation stemmed from the fact that, following the pandemic, China had become one of Ecuador's largest trading partners (in previous years, Ecuador had exported a greater volume of non-oil goods to that market, primarily from the agriculture, fisheries, mining, and oil sectors). By 2025, the country had negotiated trade agreements which were pending signature with Canada, South Korea, and the United Arab Emirates, aiming to enter these markets with agricultural and mineral products, among others, in accordance with the economic policies and objectives of the National Development Plan "*Ecuador Doesn't* Stop" (2025–2029). In early 2026, plans are being made to establish contacts and sign agreements with countries such as Saudi Arabia (National Council for

r Planning, 2025), where the goal is to promote the export of agricultural goods (fruits), fishery products (crustaceans), and manufactured goods (furniture, etc.).

Remittances from Ecuador represent an important source of income for households; this flow of money enables consumption and, in some cases, serves as a source of financing for starting or establishing businesses. In 2025, the Central Bank of Ecuador reported that, as of the third quarter, approximately $5.7 billion had been received (Central Bank of Ecuador, 2026b). This figure is very close to the full-year total for 2025, when Ecuador received nearly $6.5 billion in remittances. This flow of money can be explained by a social phenomenon: the departure of Ecuadorians who did not return to the country (migration abroad has intensified since the pandemic began). According to migration balance data, in 2025 nearly 398,000 Ecuadorians did not return, a similar figure in 2024, with 613,000 Ecuadorians who did not return to the country. On the one hand, this creates a social dynamic of divided households, where Ecuadorians who travel primarily to North America for work remain there illegally and send money home each month to cover the expenses of their families who remain in the country.

The objective of this study is to verify the existence of a causal relationship between shrimp, oil, remittances, and mining and the GDP of the Ecuadorian economy for the post-pandemic period (2021 to 2025). Variables such as shrimp, mining, and oil were selected due to their importance to the Ecuadorian economy in recent years.

Ecuador's Exports

Naranjo (2025) conducted a historical review of Ecuador, considering economic variables such as exports. The results of the analysis indicated that, despite the political changes the country underwent, it maintained an economic growth model based on the export sector, which enabled it to achieve significant growth rates. Pilicita Garrido et al. (2025) quantitatively assessed the impact of exports and imports in Ecuador; the study recommended that the country should focus more on exporting higher-value-added products to generate greater profits, given its high dependence on oil production and exports.

Reyna Pérez (2023) conducted a historical analysis of Ecuador's exports. The author detailed that the country entered the global trade system through the exchange of raw materials and natural resources, which enabled it to weather various international shocks. These shocks prompted the Ecuadorian economy to incorporate other export goods and begin to move away from its historical dependence on cocoa, a reliance inherited from its earliest export activities. Bunce and Carrillo-Maldonado (2023) analyzed oil exports and their impact on the Ecuadorian economy; the authors assessed the effects of price asymmetry (declines and increases) on GDP, and the results showed that the impact is stronger in a scenario of negative prices in the economy.

Pérez-Santillán (2023) studied the trade relationship between China and various countries in the Americas; Ecuador was one of the countries evaluated. The methodology used was input-output matrix decomposition. The results indicate that the country was a major recipient of investment, and one of the industries that improved significantly was construction. However, despite the growth in exports to that country, the trade balance was negative because imports also increased. Angulo-Bustinza and Lis-Gutiérrez (2023) confirm China's economic influence in Latin America. The study used quantitative correlational data from 2004 to 2021. The main exports to that market were raw materials and animal products; the study's findings indicated a significant negative relationship between exports to that Asian market. Renato Jácome (2024) examined the relationship between variables such as financial flows, remittances, and trade openness and

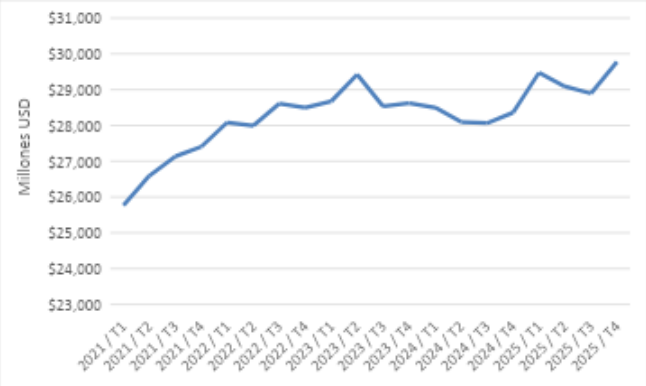
economic growth; the study used data for the sample period from 2055 to 2022 from the economies of Colombia, Ecuador, and Peru. The study employed a panel data model with random, fixed, and dynamic effects; the conclusion indicates a positive relationship between trade openness and economic growth in the countries studied.

Economic Growth in Ecuador

The Ecuadorian economy is primarily based on natural resources. By 2025, Ecuador had grown at an annual rate of 3.7%, according to preliminary data from the Central Bank of Ecuador. This figure is significant given that the economy contracted by 1.9% annually in 2024. Since the pandemic (2020 when it contracted by 9.2%), the country recovered rapidly and gradually stabilized in the following years (2021 9.4%; 2022 5.9%; 2023 1.8%). Analyzing the variables from an expenditure perspective, the components that showed the strongest growth in GDP were: exports (2%), household spending (1.7%), and FBKF (1.1%), driven by increased purchases of capital goods for industries.

Among the economic activities (industries) that will contribute most to GDP in 2025, the Central Bank of Ecuador highlights trade, with a 14.7% share, driven by increased sales at large, medium, and small businesses and strong growth in supermarket operations, fuel sales, and vehicle sales. Agriculture and livestock account for 8.3%, with this share driven by increased production, improved quality, favorable growing conditions, and strong external demand for these products. Food manufacturing accounts for 7.1%, with the main industries driving this sector including chocolate and confectionery production, dairy products, processed shrimp products, flour products, and oils, among others. Professional and technical services contribute 6.9% to the economy, with key activities such as business consulting, operational leasing, and technical and scientific services, among others.

Figure 1. Ecuador's GDP



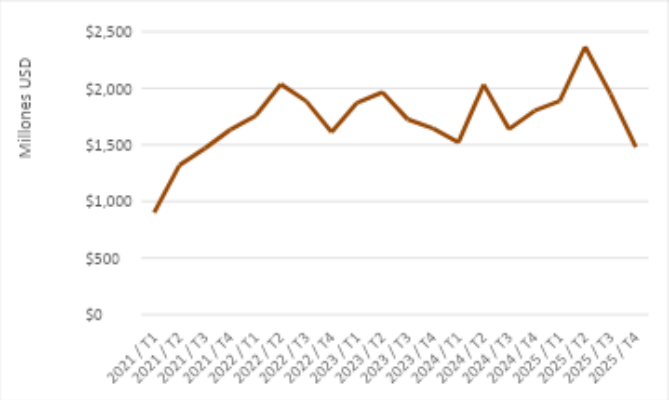
Source: Central Bank of Ecuador (2026)

Ecuador's Exports

Figure 2 shows the trend in export sales for Ecuador's shrimp sector. The graph covers the period from 2021 to 2025, and the data analyzed is on a quarterly basis. and the analyzed quarter shows growth across all variables (an upward trend). Some variables exhibit significant fluctuations due to international prices, market shocks (demand in developed countries), and socio-political-military factors.

The shrimp sector shows a clear upward trend during the analysis period (2021–2025); fluctuations in export volumes are driven by high and low prices within the sector due to its dynamics. By 2025, the shrimp sector has gained significant momentum, overtaking other commodities to become Ecuador's top export. According to bulletins from the Central Bank of Ecuador (BCE), this surge in shrimp exports is due to international demand from countries such as China, the United States, the European Union, and new Asian and African markets (Egypt, Saudi Arabia, and Sri Lanka) that companies have been able to enter in 2025.

Figure 2. Ecuador's Shrimp Exports

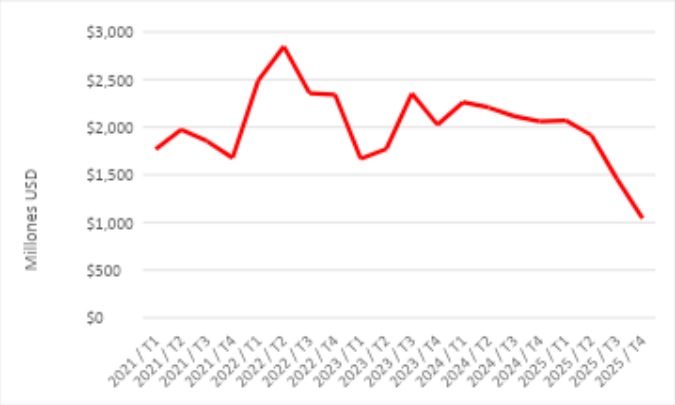


Source: Central Bank of Ecuador (2026)

However, despite a good year for the shrimp industry, certain factors have had a negative impact on the sector, such as changes in Chinese demand due to seasonal factors during the winter, and tariffs imposed by the United States as part of President Trump's trade policy (15% on shrimp in the latter part of the year) (Ministry of Production, 2025).

The country's oil sector experienced fluctuations between high and low prices from 2021 to 2023 due to geopolitical and market events; from 2024 to 2025, it shows a downward trend over time, This is due to low oil production in Ecuador caused by a lack of investment in this strategic sector, a lack of private resources, and a policy that effectively prevents the country from profiting in a scenario of high prices and lower production.

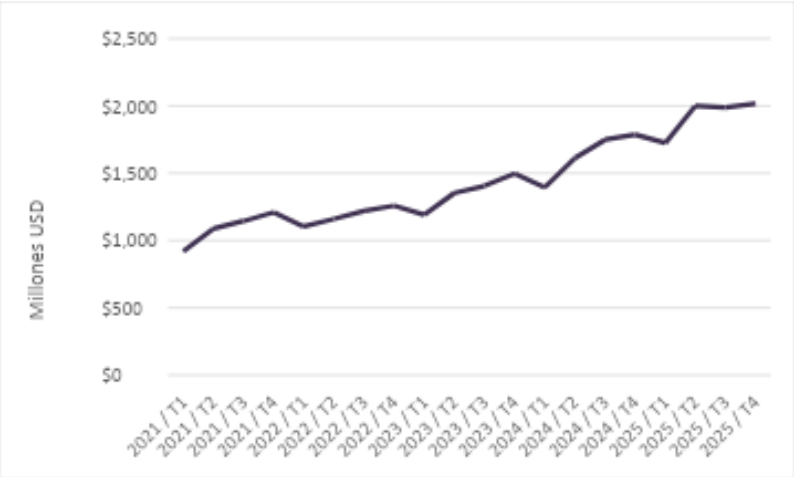
Figure 3. Ecuador's Oil Exports



Source: Central Bank of Ecuador (2026)

Regarding oil, the year 2025 presents the following developments that demonstrate a decline in exports compared to 2023 and 2024. Among the internal causes, the Central Bank of Ecuador's bulletin mentions a temporary halt in exports due to infrastructure maintenance by the OCP and SOTE carried out by the Ecuadorian government in accordance with the sector's maintenance schedule; Added to this is the drop in international crude oil prices, which has also reduced the country's exportable crude oil revenue. A key factor highlighted in the Central Bank of Ecuador's bulletin is the increase in OPEC's exportable supply and the rise in production from countries such as the United States and Brazil. With regard to international and Ecuadorian prices to give an example the benchmark price for the country at the beginning of 2025 fluctuated above $62, settling at approximately $57 in the last quarter. This reduces the value of exports as well as tax revenues for the Ecuadorian government (Central Bank of Ecuador, 2026b).

Figure 4. Remittances Received by Ecuador



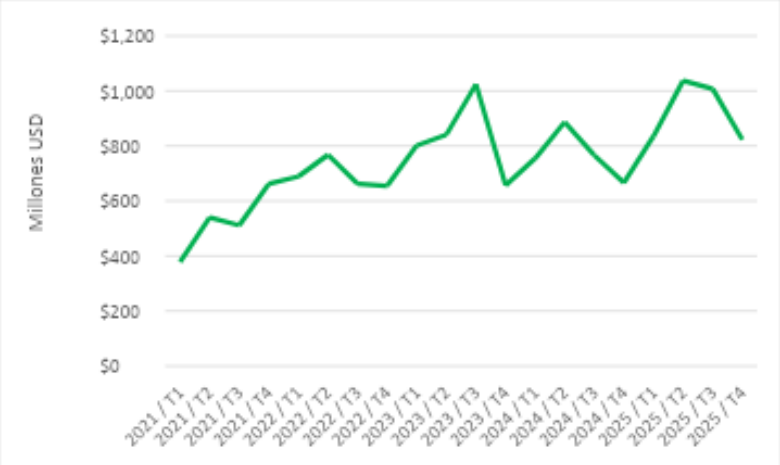
Source: Central Bank of Ecuador (2026)

Another important factor is remittances sent by Ecuadorians living abroad. Remittances play a significant role, as they are received by families to support household consumption, the construction and maintenance of real estate (houses, buildings, etc.), and, in a few cases, are also used to invest in small businesses. According to the latest report for 2025 (third quarter), remittance receipts exceeded the value of all the country's exportable goods. The main sending countries are the United States, Spain, and Italy, with the United States accounting for nearly 77% of all remittances. There are also records of remittances from other countries, such as Mexico, Chile, Canada, Peru, Colombia, the United Kingdom, Switzerland, Germany, France, and Belgium. Remittances from these countries to Ecuador total 7% (Central Bank of Ecuador, 2026a).

Regarding the receipt of remittances, the Central Bank of Ecuador (BCE) reports that the majority of remittance transactions in 2025 were processed by private banks (60.1%), remittance companies (36.9%), and cooperatives (3%). The provinces that accounted for the majority of remittances received nationwide are: Guayas, Pichincha, and Azuay. Based on figures from the Central Bank of Ecuador's bulletin, it is evident that remittance receipts in the Amazonian provinces are minimal. In the coastal region, remittances are concentrated in the provinces of

Guayas, Manabí, and El Oro. In the inter-Andean region, the provinces of Pichincha, Azuay, Cañar, Tungurahua, and Chimborazo account for the largest share. This entire flow of funds generates dynamics in the financial and commercial sectors of various industries (Central Bank of Ecuador, 2026a).

Figure 5. Ecuador's Mining Exports



Source: Central Bank of Ecuador (2026)

With regard to mining, Ecuador established the Ministry of Mining in 2015, a move prompted by low oil prices in previous years, which had impacted the country's exports and government revenues. Beginning that year, the mining industry was promoted, leading to the first investments in the sector in 2017. Ecuador exports products such as gold, lead and copper concentrates, and other mining products. Despite environmental and social concerns opposing mining activities, the country has increased mining production and exports, even in the face of challenges posed by illegal mining. Ecuador conducts mining operations in all three of its regions: on a very limited scale along the coast in the province of El Oro; in the Inter-Andean region, which includes four provinces Imbabura, Cotopaxi, Bolívar, and Azuay where minerals are produced on a medium scale; and in the Amazon region, which includes two provinces Zamora Chinchipe and Morona Santiago with the latter accounting for the largest volume of mineral production in Ecuador.

During the analysis period (2021–2025) covered by this study, it is evident that Ecuador's export volume is growing; in the last year, this export commodity ranked among the top 10. With regard to gold, global financial dynamics caused the price per ounce to rise, which benefited the country in the international market; Ecuador exports gold to the United States, Switzerland, and the United Arab Emirates, among others. With regard to lead and copper concentrates and other mining products, the country exported metric tons to countries such as China, South Korea, Canada, and the European Union. The increase in exports can be explained on the demand side by requirements in the energy sector, while on the supply side, climatic and operational factors limited production for countries and companies worldwide.

Causality of Shrimp, Oil, Mining, and Remittance Exports to the Ecuadorian Economy in the Post-Pandemic Era.

The study verified the existence of causality among the variables; the data for this study were obtained from the website of the Central Bank of Ecuador for the analysis period from 2021 to 2025 on a quarterly basis. To determine causality, the time series were tested using the Dickey-Fuller test via STATA software; the test results indicated that all variables have an integration order of 2 (second- -difference). This step was necessary for processing the variables for causality analysis. For lag selection, it was determined that two lags are necessary for estimating the autoregressive vector of the variables. Once the model was estimated, it passed the residual tests (Jarque-Bera test, p-values greater than 5% Table 1) and the VAR stability test.

Table 1. *Results of the Jarque-Bera test*

Equation	chi2	df	Prob > chi2
d2GDP	0.538	2	0.76425
d2Shrimp	0.721	2	0.69716
d2Oil	0.537	2	0.76443
d2Mining	0.733	2	0.69328
d2Remesas	1.603	2	0.44854
ALL	4,133	10	0.94117

Source: STATA results (2026)

Table 2 presents the main results of Granger causality for the variables mentioned (Bazán Navarro & Álvarez-Quiroz, 2022) (Larios-Meoño et al., 2021). Causality was verified using the chi-square test; if the p-value is less than 5%, causality is indicated for the variable; conversely, if the p-value is greater than 5%, no causality is indicated between the variables. The results in Table 1 indicate that shrimp exhibited a causal relationship with the GDP of the Ecuadorian economy (Shrimp→GDP); similarly, remittances were found to have a causal relationship with GDP (Remittances→GDP). In contrast, oil and mining did not exhibit a causal relationship with GDP during the period analyzed.

Table 2. *Causality toward GDP*

Equation	Excluded	chi2	df	Prob > chi2
d2GDP	d2Shrimp	72,246	2	0.027
d2GDP	d2Oil	21,081	2	0.349
d2GDP	d2Mining	20,999	2	0.350
d2GDP	d2Remittances	50,117	2	0.082
d2GDP	ALL	21,959	8	0.005

Source: STATA results (2026)

Table 3 presents the results of the causality analysis from GDP to exportable variables and remittances. The study found that GDP did not generate causality (p-value greater than 5%)

toward shrimp or remittances. However, GDP does have a causal effect on the oil and mining industries in Ecuador. ($GDP \rightarrow$ Oil and $GDP \rightarrow$ Remittances). Based on the results obtained for the variables in relation to GDP, the following can be detailed: There is a unidirectional (one-way) relationship between GDP and shrimp; shrimp production stimulates economic growth in Ecuador. The remittances variable showed a unidirectional relationship with GDP (remittances cause GDP). A unidirectional relationship was determined from GDP to oil and mining exports.

Table 3. *Causality from GDP to the variables*

Equation	Excluded	chi2	df	Prob > chi2
d2Shrimp	d2GDP	41,876	2	0.123
d2Oil	d2GDP	21,207	2	0.000
d2Mining	d2GDP	53,569	2	0.000
d2Remittances	d2GDP	13,725	2	0.503

Source: STATA results (2026)

Conclusions

Ecuador has improved its foreign trade policy over the past eight years; the impetus provided by successive administrations to sign trade agreements has led to improved access to European, Asian, and American markets. Since 2017, economic policy has favored trade liberalization. Within this context, it is evident that products such as shrimp, oil, and mining play a significant role in Ecuador's trade balance, and the country has achieved greater diversification of its exports over time (Reyna Pérez, 2023).

The study evaluates Granger causality, revealing a unidirectional relationship between shrimp and remittances and GDP; this was reinforced by the sustained growth of both exports in the post-pandemic period. The upward trend is more pronounced for remittances, given the flow of dollars sent primarily from the United States to the country. Shrimp prices fluctuate due to market factors, causing them to decline in certain quarters; however, since 2021, they have shown an upward trend.

These findings can inform the development of more targeted public policies to promote export industries such as the shrimp sector. While it is true that recent administrations have signed trade agreements that include shrimp among the negotiated items, there have been no specific collaborative initiatives with the private sector. Shrimp has achieved high sales levels primarily due to demand from developed and Asian countries during the analysis period (2021–2025). Despite an upward trend during this period, the shrimp industry faces a less favorable outlook in 2025 due to tariffs in the U.S. market and declining demand from China.

In terms of remittances, this sector became a greater source of foreign exchange in 2025 compared to exports. The primary purpose of remittances is to support the households of family members residing abroad; the majority of remittances are processed through the financial system (60%). The provinces that receive the largest amount of remittances are Guayas, Pichincha, and Azuay. Remittances originate primarily from the United States and, to a lesser extent, from Spain and Italy. This inflow of funds resulted from the departure of migrants to third countries and was further exacerbated by the COVID-19 pandemic; this financial assistance enables households to make purchases and maintain their standard of living in the country.

Remittances show an upward trend in Ecuador's GDP during the sample period. The data confirm that the United States is the primary source of remittance flows, even with the controls in place there since 2025; the amount continues to increase as a result of Ecuadorian migration. When migrants send these funds to their home communities, consumption in the economy improves due to the inflow of these funds. In the case of mining and oil, these industries generate spillover effects on other industries through goods and services; this explains their significance in terms of their share of GDP and the tax revenue they generate for the government, hence the importance of these sectors within the country's sectoral policy. However, for the sample period, there is a unidirectional relationship from GDP to mining and oil.

Regarding the oil sector, Ecuador has a significant level of export revenue; even with the decline seen over the past two years, the country has stopped generating revenue due to lower oil production caused by factors such as a lack of investment and maintenance of oil infrastructure. Ecuador primarily exports two types of crude oil Oriente and Napo which are shipped to markets in the Americas (the United States, Panama, Peru, Chile, and Colombia), European markets (the European Union), and Asian markets (China). Although it remains an exportable product, the price has been declining in recent years due to market factors such as increased oil supply (Central Bank of Ecuador, 2025a). With regard to mining, Ecuador exports minerals such as gold, lead and copper concentrates, and other mining products to Asian, European, and American markets. The country has mining operations in all three regions of the continent, with the Amazon region (Morono Santiago province) being the most important. The mining sector was aided by factors such as rising prices on the international market; due to dynamics in the international market, gold served as a safe-haven asset and its price rose, creating a favorable environment for mineral exports (Central Bank of Ecuador, 2025b).

Mining in Ecuador is an industry with great potential that the Ecuadorian government aims to promote through the signing of international investment agreements and competitive bidding processes. A similar situation exists with oil in Ecuador, where the government is seeking external resources to sign contracts aimed at reviving exports, given low levels of public investment. However, for the analysis of the post-pandemic period (2021–2025), oil does not contribute to GDP; this is further underscored by the volatility of international prices, where, in negative scenarios, the impact on the economy is severe (Bunce & Carrillo-Maldonado, 2023).

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Preventive Guidance in Initial Teacher Education: Integrating Curriculum and Practice in Ecuador

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Introduction

Teacher education in Ecuador is guided by the Basic General Education Curriculum, which conceives of education as a process of holistic development that integrates cognitive, socio-emotional, and ethical learning from a perspective of inclusion and attention to diversity (Ministry of Education of Ecuador, 2016). This curricular framework requires teachers to assume a role that goes beyond the mere transmission of content, becoming mediators of human development, promoters of harmonious coexistence, and agents of educational prevention in the classroom.

In the current context of Basic General Education (EGB), schools face challenges related to harmonious coexistence, socio-emotional well-being, the early detection of educational needs, and the prevention of risky situations. National guidelines emphasize that schools must serve as protective spaces that foster respectful relationships and implement proactive pedagogical measures to address violence and exclusion (Ecuadorian Ministry of Education, 2021). These requirements position classroom teachers as the first line of support, responsible for developing timely educational responses aligned with the curriculum and the community context.

The curriculum for the Education degree program at UBE organizes learning into components involving interaction with teachers, practical and experimental learning, and systematic field placements, which enables a progressive approach to the teaching role. Although there is no explicit "Pedagogical Training" track, courses in Pedagogy, Didactics, Psychology, and Assessment constitute the foundation upon which professional practice is developed, including the role of preventive guidance.

From this curricular perspective, it is possible to analyze the current tensions in initial teacher education. The specialized literature warns that preparing teachers to address diversity, inclusion, and socio-emotional needs requires moving beyond training focused exclusively on the instructional dimension (Rowan et al., 2021; Caires et al., 2023; Vaillant and Marcelo, 2021). Within this framework, the preventive guidance role cannot be fragmented or associated exclusively with specialized support teams; rather, it must be integrated into teachers' professional practice. This perspective aligns with approaches that recognize social-emotional learning as a cross-cutting component of development and learning (UNESCO, 2022, 2024a). Consequently, the education degree program must strengthen competencies for observing, supporting, mediating, and preventing issues within everyday pedagogical practice.

Pre-professional practicums provide a strategic setting for this purpose, as they allow student teachers to engage with real-world challenges in elementary and middle school education and to develop skills in pedagogical diagnosis, mediation, and collaborative work with the educational community (Council on Higher Education, 2022). However, an analysis of curricula

and training experiences reveals insufficient alignment between these practicums, the national curriculum, and the future teachers' preparation in preventive guidance.

An assessment conducted with students and faculty in the Education program at the Bolivarian University of Ecuador confirmed these limitations: (a) limited theoretical and practical coverage of preventive guidance in courses within the Pedagogical Training track; (b) limited development of skills to identify barriers to learning and participation at an early stage; and (c) weaknesses in the design of preventive interventions during pre-professional practicums.

These shortcomings are not due to a complete absence of curricular opportunities, but rather to weak coordination between courses in the field of pedagogy, pre-professional practicums, and training in preventive guidance. The challenge lies in reframing Pedagogy, Didactics, Psychology, Assessment, and professional practice as intentional settings for developing skills in observation, early detection, mediation, and support. Based on this situation, the following research question was formulated: How can the training in the preventive guidance function be strengthened for students in the Bachelor's Degree in Educational Sciences through the integration of the Basic General Education Curriculum and pre-professional practicums?

The study's contribution lies in contextualizing the preventive guidance function within the early stages of teacher training the second and third semesters when observation and pedagogical support activities predominate. The proposal incorporates this role into students' practical work and links it to the Basic General Education Curriculum and the National Policy on School Coexistence. Its originality should be understood as a contextual and methodological contribution to UBE, not as proof of superiority over other training models.

Its innovative nature is expressed in: (a) a pedagogical model contextualized for the UBE that links curriculum, practice, and prevention; (b) a system of tools tailored to the initial levels of training; and (c) a phased strategy that allows for a transition from basic detection to guided pedagogical action. This approach moves beyond the welfare-based view of guidance and conceives of it as an early teaching competency, verifiable through classroom evidence.

In response to the problem, a pedagogical strategy was developed and evaluated, aligned with the EGB Curriculum (Ecuadorian Ministry of Education, 2016), the National Policy on School Coexistence (Ecuadorian Ministry of Education, 2021), and the requirements of pre-professional practice (Council on Higher Education, 2022). The classroom teacher is viewed as a first-line preventive agent, complementing specialized agencies: they observe, document, intervene pedagogically, and activate institutional channels when the situation exceeds their professional competence.

The objective of the study was to develop and evaluate a pedagogical strategy for training in the preventive guidance role, aligned with the EGB curriculum and the pre-professional practicums of the Bachelor's Degree in Educational Sciences at UBE.

Methodological Approach to Understanding the Preventive Guidance Role in the Initial Teacher Education Process

The study of the preventive guidance role in initial teacher education requires a methodological approach that allows for an understanding of the complexity of training processes, the dynamics of pre-professional practice, and the preventive demands that arise in current educational contexts. From this perspective, the research adopts an integrative approach that combines the

contributions of qualitative and quantitative methodologies to analyze the educational reality from multiple dimensions, promoting not only the description and understanding of the phenomenon but also the development of proposals aimed at its transformation.

The methodological approach adopted responds to the need to scientifically ground a strategy that strengthens the preparation of future teachers for the exercise of the preventive guidance role in accordance with the requirements of the Ecuadorian curriculum and the needs of contemporary educational settings.

The research was conducted using a mixed-methods approach predominantly qualitative with quantitative support aimed at understanding the training for the preventive guidance role and supporting a contextualized pedagogical proposal. A descriptive-propositional design with a formative intervention was adopted, organized into four interconnected phases: initial assessment, pedagogical modeling, implementation in practical settings, and evaluation of the proposal based on expert criteria. The study was conducted in the Education Sciences program at the Bolivarian University of Ecuador, in collaboration with institutions of General Basic Education, during a regular academic term and with follow-up in real-world supervised practice settings.

The sample was a non-probabilistic, purposive sample consisting of 31 second- and third-semester students in pre-professional practicums, 5 university faculty members from the Teacher Education track, and 5 external experts for the validation of the model and strategy. Selection was based on criteria of direct involvement with pedagogical courses and active participation in real classroom settings.

At the theoretical level, historical-logical, systemic-structural-functional, hermeneutic-dialectical, and modeling methods were employed to ground the integration of curriculum, practice, and prevention and to structure the pedagogical model. At the empirical level, the following were applied: structured pedagogical observation in elementary and middle school classrooms, semi-structured interviews with students, a Likert-scale survey of university faculty, a documentary analysis of the Basic General Education Curriculum (2016), the National Policy on School Coexistence (2021), the Academic Regulations (Council of Higher Education, 2022), and institutional syllabi, in addition to expert assessments of relevance, coherence, and feasibility. The instruments were adapted to the progressive nature of the practices and the participants' educational level.

Data processing combined categorical qualitative analysis and descriptive statistics. Information from observations, interviews, and documents was organized into four categories: early detection, pedagogical mediation, socio-emotional support, and institutional coordination. Responses from the survey and the external assessment were synthesized using frequencies and descriptive trends. Triangulation involved cross-checking sources, techniques, and normative references. Because the available documentation does not include the primary matrices necessary to calculate concordance or correlation coefficients, no inferential statistics are reported. Therefore, the assessment by the five experts is interpreted as an external evaluation of the proposal and not as proof of its effectiveness.

Ethical criteria regarding informed consent, anonymity, and the academic use of information were applied, ensuring that participation was voluntary and that the instruments were aligned with the intended educational scope for the first semesters.

The procedure made it possible to characterize conceptions, practices, and educational needs associated with the preventive guidance function and to use this evidence as input for modeling. The combination of sources provided interpretive consistency to the assessment; however, the descriptive-propositional design, the intentional selection, and the absence of a comparison group limit the scope of the conclusions.

A Critical Analysis of the Current State of Initial Teacher Education in the Education Program at the Bolivarian University of Ecuador

Teacher education today faces the challenge of responding to increasingly complex and heterogeneous classrooms. On the one hand, Rowan et al. (2021) examine teacher preparation in light of student diversity, emphasizing the urgency of designing effective training strategies and identifying the institutional or pedagogical factors that limit this process. This lack of preventive preparation is frequently evident in practice; for example, Amigo-López et al. (2026) argue that classroom behavior management remains a critical and complex aspect of the profession, especially in contexts of high social vulnerability, where a reactive response on the part of the teacher often predominates over a preventive approach.

To overcome these limitations, recent literature emphasizes the development of soft skills from the early stages of the career. In this regard, Caires et al. (2023) highlight that social-emotional competencies are essential in initial teacher education, given that teachers consider not only their students' cognitive development but also their emotional and social growth. Reinforcing this position, Llorent et al. (2024) point out that these competencies directly promote academic performance and the development of healthy interpersonal relationships within the school. Furthermore, these authors argue that teachers who adopt inclusive approaches are more successful in fostering their students' social-emotional skills.

The positive impact of these inclusive and emotionally focused methodologies is not limited to theory but translates into improved educational outcomes. In this regard, Martinsone et al. (2025) analyzed the implementation of the universal prevention program "Promoting Mental Health at Schools" (PROMEHS), demonstrating that strengthening social-emotional skills directly promotes better learning outcomes in upper secondary education.

Ultimately, for these competencies and approaches to take root in the education system, monitoring mechanisms are essential. Thus, Zhang et al. (2022) demonstrate the value of professional standardization by showing how state regulatory frameworks can be transformed into formalized and effective tools for teacher self-assessment, thereby ensuring continuous improvement starting in early childhood education.

A critical analysis of the current state of initial teacher education is essential for understanding the strengths and limitations that influence the development of the preventive guidance function. In the context of the Education program at the Bolivarian University of Ecuador, this assessment allows for an examination of the alignment between training processes, the regulatory requirements of the Ecuadorian education system, and the real needs that emerge in pre-professional practice settings. From this perspective, it is considered that the training of future teachers must go beyond the instructional dimension to incorporate competencies focused on prevention, inclusion, socio-emotional support, and the promotion of positive school community dynamics.

The analysis of the results was conducted by examining the relationship between the initial training provided in the Education program at UBE, the requirements of the Basic General Education Curriculum, and pre-professional practicum settings. This analysis made it possible to assess the extent to which the preparation of future teachers supports their performance as primary-level prevention agents, capable of integrating guidance into planning, classroom management, and school community life.

Assessment of the State of Preventive Guidance

The triangulation of document analysis, observations, interviews, and the survey allowed the findings to be organized into three interpretive themes:

1. Insufficient curricular integration

The syllabi for the Pedagogical Training track address guidance in a theoretical manner, with little explicit reference to the Basic General Education Curriculum (EGA) or the guidelines for school community life.

Academic assignments prioritize subject-area instructional planning over risk identification, inclusion, or well-being.

2. Transfer limited to pre-professional practice

Students report difficulties in translating theory into concrete preventive actions.

A prevailing view holds that addressing issues is delegated to the DECE.

3. Conditions favorable for improvement

High motivation to learn mediation and support strategies.

Faculty willingness to integrate the social-emotional approach.

Overall, the findings indicate that the preventive guidance function is not yet systematically articulated as a cross-cutting competency in the context studied. This interpretation is limited to the selected sources and participants and does not represent an assessment of all Ecuadorian institutions.

The assessment conducted by five experts was favorable regarding the proposal's relevance, coherence, and institutional feasibility. This external judgment was interpreted as complementary to the triangulation of the study's qualitative and descriptive evidence, without attributing causal efficacy to said assessment.

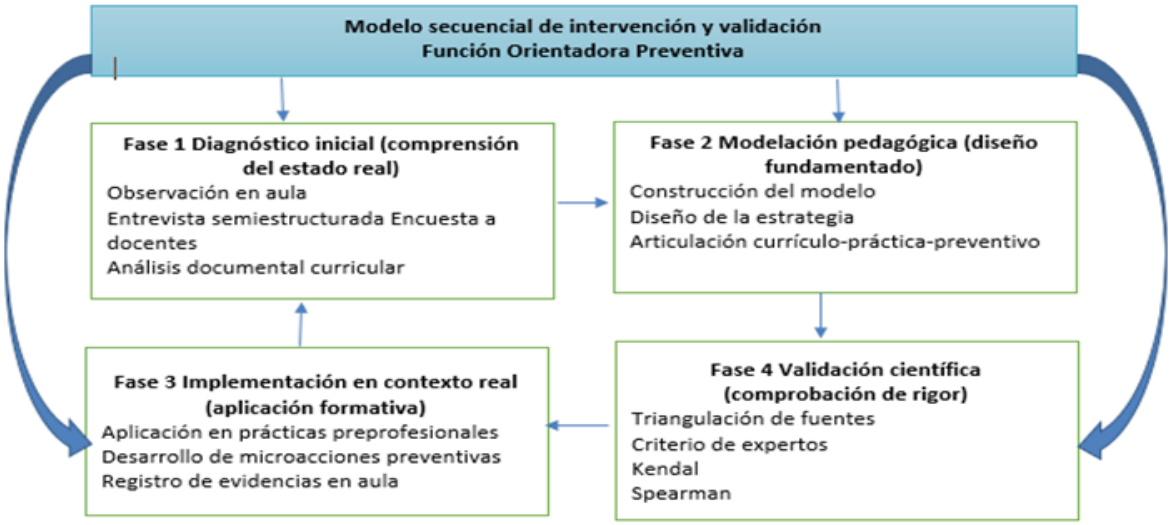
The assessment identified areas for improvement and, simultaneously, institutional conditions conducive to implementing the proposal: student interest in mediation strategies and faculty openness to the social-emotional approach. The assessment by the five experts was favorable regarding the proposal's relevance, internal coherence, and institutional feasibility. Given its descriptive nature, this assessment complements the triangulation but does not attest to learning outcomes or causal efficacy.

Pedagogical Modeling of the Preventive Guidance Function in Initial Teacher Education in the Education Program, Bachelor of Science in Education

Training in the preventive guidance function in higher education requires theoretical and methodological frameworks that allow for the integration of the demands of the educational context with the processes of teacher professionalization. In this regard, pedagogical modeling constitutes a scientific resource that enables the systemic representation of the essential relationships involved in the training process, identifying components, interactions, and patterns that guide the transformation of educational practice. From this perspective, the construction of a pedagogical model allows for the organization and justification of the actions necessary to strengthen the preventive performance of future teachers, ensuring coordination between the curriculum, pre-professional practice, and attention to the socio-educational needs present in Basic General Education settings.

Based on the diagnostic analysis conducted and the theoretical framework developed, we proceeded to create a pedagogical model of the preventive guidance function in initial teacher education. This model synthesizes the conceptual foundations, the training subsystems, and the relationships between curriculum, practice, and prevention, thereby constituting the structural basis of the proposed strategy. Figure 1 presents the architecture of the model and its essential components.

Figure 1. Sequence of the pedagogical model of the preventive guidance function



Source: Author's own work

The model presented in Figure 1 synthesizes the interrelationship between curricular components, the demands of the Basic General Education context, and the progressive development of guidance competencies in initial teacher education. Its structure integrates theoretical foundations, training subsystems, and functional relationships that guide the preparation of students as first-line prevention agents. However, to ensure its applicability in real-world pre-professional practice settings, it is necessary to operationalize its principles into

concrete, sequenced actions. In response to this need, the pedagogical strategy outlined below was designed.

Pedagogical Strategy for Training in the Preventive Guidance Function

The purpose of the designed pedagogical strategy is to systematically integrate the preventive guidance function into the initial teacher education process, beginning with pre-professional practicums. It is structured into three interconnected phases.

The strategy is based on the principles of curriculum-practice integration, early prevention, and progressive training, ensuring consistency with Ecuador's Basic General Education Curriculum and Guidelines for School Coexistence.

The strategy constitutes the practical implementation of the proposed pedagogical model and operationalizes its subsystems into verifiable actions within pre-professional practice.

Table 1. *Structure of the pedagogical strategy for training in preventive guidance*

Phase	Educational Purpose	Key Actions	Pedagogical Basis	Expected Outcomes
Assessment and Awareness-Raising	Developing a preventive pedagogical reading approach of the context	Analysis of real-life cases; use of observation forms; identification of risk and protective factors	Primary prevention; ecological approach to development; social-emotional learning	Early detection records; evidence-based reflection on the teacher's role
Training and preventive planning	Integrating prevention into instructional planning	Social skills workshops; design of micro-actions; incorporation of social-emotional objectives	Situated learning; early professional development; curriculum–practice integration	Preventive-focused lesson planning; basic classroom protocols
Implementation and feedback in practice	Consolidating the preventive role in supervised practice	Basic tutoring; pedagogical mediation; coordination with the tutor and DECE; reflective journaling	Tiered prevention model; pedagogical mediation	Evidence of preventive micro-actions; practice reports; improved school–family coordination

Source: Author's own work

The preventive guidance function was operationalized through indicators of early detection, basic pedagogical mediation, socio-emotional support, and institutional coordination.

Table 2. *Curriculum – Strategy – Practice*

EGB Curriculum	Teacher Competency	Strategic Action	Evidence	Curriculum Subject
Inclusion	Early Detection	Diagnostic Phase	Course Description	Psychology I–II
Coexistence	Mediation	Workshops	Curriculum	General Pedagogy
Well-being	Support	Tutoring	Report	Pedagogy I–II
Participation	Family Work	Projects	Minutes	Work Experience

Source: Prepared by the author

Table 3. *Alignment Matrix Between EGB Requirements, Teaching Competencies, and Evidence of Practice*

EGB Requirement	Competency Developed	Evidence
Inclusion	Early detection	Fact Sheet
Coexistence	Mediation	Plan
Well-being	Tutoring	Report
Participation	Family Work	Project

Source: Prepared by the author

The strategy constitutes the operational implementation of the model by integrating assessment, training, and supervised application in pre-professional practice. Its expected evidence observation forms, preventive planning, reflective logs, and coordination reports enables performance monitoring without confusing the trainee's pedagogical roles with the DECE's specialized intervention.

The alignment between foundational principles, curricular requirements, phases, and evidence supports the educational relevance of the strategy. Its feasibility was viewed favorably by experts; its effectiveness must be examined in subsequent studies using pre- and post-tests, explicit performance criteria, and longitudinal follow-up.

The model and its strategic implementation offer a contextualized alternative for organizing training in the preventive guidance function. The main contribution is methodological: it translates principles of inclusion, coexistence, and well-being into observable actions and outcomes during the practicum. This contribution does not equate to asserting that the strategy caused transformations, as the design and available data do not permit such an inference.

Interpretation of the Results Regarding the Understanding of the Preventive Guidance Role in the Initial Teacher Education Process

The interpretation of the results constitutes an essential phase of the research process, as it allows us to understand the scope of the transformations generated, to compare the findings with the assumed theoretical frameworks, and to assess the proposal's contribution to the improvement of initial teacher education. From this perspective, the analysis conducted goes beyond a mere description of the results obtained to focus on understanding the relationships between curriculum, pre-professional practice, and the preventive guidance function, as well as on the possibilities for consolidating the latter as an indispensable professional competency for teaching in current educational contexts.

This analysis aligns with the systematic review by Rowan et al. (2021), which identifies preparing teachers to respond to diversity as a persistent challenge in initial teacher education. In the case studied, this difficulty is reflected in the lack of an explicit connection between pedagogical content, the preventive demands of the EGB, and the decisions made by student teachers when faced with situations involving coexistence, inclusion, or well-being. This convergence strengthens the plausibility of the analysis, although it does not justify extrapolating it to all education degree programs.

The emphasis placed on social-emotional skills is also consistent with Caires et al. (2023), who document the possibility of developing these skills through specific programs in initial teacher education, and with Llorent et al. (2024), whose study links inclusive teaching practices to students' social-emotional development. This body of research supports the intentional incorporation of observation, mediation, and support into the strategy. However, the present study evaluates the design and its contextual fit; it does not measure students' social-emotional outcomes.

This interpretation is also supported by Bisquerra (2019) and Álvarez Rojo (2020), who emphasize the need to move beyond teacher training focused exclusively on the instructional dimension and to systematically incorporate guidance and emotional education. In the specific context of initial teacher education, Rodriguez Caballero et al. (2021) identify the preventive guidance function as a component of the future teacher's professional practice. These references help us understand prevention not as an additional task, but as a dimension integrated into pedagogical performance.

Pre-professional practice serves as the connecting space because it allows students to apply academic knowledge to real-world problems and to subject pedagogical decisions to observation and feedback. This idea aligns with Núñez-Rojas et al. (2021), who highlight action research as a means of developing teaching competencies. In the proposed strategy, the reflective journal fulfills this function: it transforms experience into analyzable evidence and prevents practice from being reduced to merely clocking in hours or repeating routines.

In the Ecuadorian context, this integration of training and practice takes on special relevance. García-Vila and Pérez-Martínez (2026) analyze university curricula and highlight tensions in the practical preparation of teachers, while Mendoza-López and Silva-Carrión (2026) examine the practicum from the perspective of professional mentors. Complementarily, Macías-Mendoza et al. (2022) propose reflective pre-professional practicums as a way to strengthen initial teacher

education. Taken together, these contributions support the need to transform teaching practice into a systematic space for observation, reflection, and preventive pedagogical action.

At the policy level, the EGB Curriculum and the National Policy on School Coexistence call for inclusion, participation, protection, and environments conducive to learning (Ministry of Education of Ecuador, 2016, 2021). The Academic Regulations, for their part, recognize the integration of professional learning and practicums (Council for Higher Education, 2022). The proposal articulates these levels through situated micro-actions but maintains a functional boundary: the future teacher identifies signs, develops initial pedagogical responses, and coordinates referrals; they do not make clinical diagnoses or replace the DECE.

The international literature on social-emotional learning provides a complementary framework. UNESCO (2022, 2024a) advocates for its systemic integration rather than as an isolated activity. In this vein, the strategy links social-emotional objectives, instructional planning, classroom dynamics, and reflection on practice. The value of this integration lies in its curricular coherence; its impact must be verified using previously defined indicators and longitudinal data.

This perspective is expanded upon by the guidelines from UNESCO (2024b, 2024c), which reinforce the understanding of social-emotional learning and offer guidelines for its implementation in education. At the institutional level, the educational profile of the Bachelor's Degree in Educational Sciences at the Bolivarian University of Ecuador (2023) provides a contextual framework for integrating pedagogical, instructional, and research competencies with the holistic care of the learner. The convergence of these international and institutional references strengthens the curricular relevance of the proposed strategy.

The favorable assessment by five experts provides initial evidence of relevance, coherence, and feasibility, but its scope is limited by the size of the panel and the absence of matrices that would allow for the reproduction of inferential statistics. Consequently, the main result is a well-reasoned and contextualized proposal, not proof of effectiveness. This delimitation enhances the consistency between the objective, design, data, and conclusions.

Limitations include the small, purposive sample; the study's focus on a single institution; the limited duration of the initial teaching practicums; the absence of a comparison group; and the lack of primary data to replicate the experts' quantitative assessment. These conditions limit the generalizability of the findings and do not allow for the establishment of causal efficacy. Future research should incorporate pretest-posttest evaluations, rubrics with evidence of validity and reliability, longitudinal follow-up, the participation of school mentors, and applications at other institutions.

Conclusions

The analysis supports the need to explicitly integrate the preventive guidance function into initial teacher education as a professional competency linked to pedagogy, didactics, psychology, assessment, and pre-professional practice. In the context analyzed, insufficient curricular integration was identified, along with difficulties in translating theoretical frameworks into classroom actions and a tendency to delegate prevention to specialized agencies. Pre-professional practicums offer the ideal setting for integrating knowledge, observation, decision-making, and feedback. The proposed strategy organizes this process into three progressive phases and defines observable indicators for early detection, preventive planning, pedagogical

mediation, and institutional coordination. Its implementation must be supervised and remain within the professional boundaries of the teacher in training.

The strategy demonstrated conceptual alignment with the principles of inclusion, coexistence, and well-being outlined in the EGB Curriculum and was favorably evaluated by five experts in terms of relevance, coherence, and institutional feasibility. This result supports its pilot implementation and refinement but does not demonstrate generalizable efficacy. Verifying its effects requires subsequent evaluation designs, comprehensive primary data, and longitudinal follow-up. The preventive guidance function complements rather than replaces the responsibilities of the DECE and other specialized services. The teacher's contribution lies in daily observation, the initial pedagogical response, the promotion of harmonious coexistence, and the timely activation of institutional support pathways. The next research priority is to evaluate the strategy using predefined indicators and to compare student performance before and after its implementation.

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Generative Artificial Intelligence as a Formative Mediator in the Design of Mathematics Tasks: An Ontosemiotic Analysis of Epistemic Didactic Suitability in Teacher Education

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Introduction

Mathematics education is undergoing a phase in which instructional decisions are intertwined with tools capable of generating text, examples, explanations, and problems in a matter of seconds. Generative artificial intelligence (GAI) expands design possibilities but also necessitates a reevaluation of what constitutes a high-quality task. Pochulu (2025) identifies the creation and reformulation of problems as among the uses with the greatest potential for mathematics education, while Mollick and Mollick (2023) caution that the educational value of these systems depends on maintaining active human supervision. The issue, therefore, is not merely incorporating technology, but deciding what mathematical knowledge is at stake and by what criteria it is validated.

The tension between executing procedures and constructing meaning predates AI-assisted learning. In mathematics education, the way a problem is presented can either encourage algorithmic repetition or create space for interpreting, reasoning, modeling, and relating representations. The literature on teacher education has shown that these decisions are not neutral: they express conceptions about mathematics, its teaching, and the practices considered legitimate (Pochulu and Rodríguez, 2012). Therefore, a school assignment is not reduced to the statement the student receives. It also organizes the expected mathematical activity, defines the objects to be manipulated, and determines the type of reasoning that may emerge during its solution.

Designing a task involves articulating learning objectives, content, procedures, languages, representations, and forms of validation. When these components are reduced to a closed-ended instruction, the activity may be correct from an operational standpoint and yet offer few opportunities for understanding. Pochulu and Font (2025) show that criteria for pedagogical suitability allow for the review of instructions generated or reformulated using IAG from a perspective that is more rigorous than the mere appearance of innovation. This approach shifts the focus from technological novelty toward the quality of the mathematical- y relationships that the task facilitates and toward the decisions the teacher must justify before bringing it into the classroom.

IAG changes the landscape because it allows for the creation of variations on a single task, the alteration of contexts, the proposal of representations, and the testing of alternative ways of asking questions. This speed can support planning, but it can also lead to the acceptance of plausible answers without reviewing their mathematical or pedagogical relevance. Mollick and Mollick (2023) propose educational uses in which the user remains within the control loop, evaluating errors, biases, and limitations in the generated output. Applied to the design of math tasks, this principle implies that the teacher formulates the intent, queries the tool, evaluates the proposals, and retains responsibility for the version ultimately used.

The most obvious risk arises when a more extensive or contextualized instruction is mistaken for a higher-quality task. Ramírez Bogantes and Mejía Luna (2026) describe precisely the tension between an instrumental use of the IAG, geared toward efficiency, and the pursuit of mathematical learning involving greater cognitive complexity. A task statement may incorporate an engaging story while still requiring a mechanical application; it may also multiply instructions without improving understanding. Evaluating the task therefore requires examining the mathematical meanings involved, the relationships between representations, the scope for choosing procedures, and the actual need to justify answers.

The Ontosemiotic Approach to Mathematical Knowledge and Instruction (EOS) offers tools for conducting such an analysis. Godino (2024) presents the approach as a system of concepts designed to describe the objects, practices, meanings, and processes involved in mathematical activity and its teaching. From this perspective, knowledge is not treated as a collection of isolated pieces of content, but rather as a web of institutionally shared practices and meanings. When applied to instructional design, the EOS allows us to ask which mathematical objects appear in a task, how they relate to one another, and which practices of problem-solving, communication, and validation students are expected to develop.

Within the EOS, instructional appropriateness serves as a tool for evaluating teaching processes and guiding their improvement. Godino (2011) proposes indicators that allow for the examination of different facets of this appropriateness, and Beltrán-Pellicer and Giacomone (2018) demonstrate its usefulness in teacher education for structuring reflection on practice. This chapter focuses its analysis on the epistemic facet: the aim is to determine whether the tasks mobilize relevant, sufficiently representative, and interconnected mathematical meanings. The question is not limited to verifying that the result is correct; it seeks to establish whether the activity provides the conditions for producing, communicating, and justifying meaningful mathematics.

Based on this tension, the chapter's problem is defined: to understand what transformations are observed in the epistemic configuration of mathematical tasks when teachers in continuing education incorporate GAI into their design process. The focus is not on attributing improvement to the tool in and of itself, but rather on analyzing how technological interaction relates to professional knowledge, criteria of appropriateness, and the revision decisions made by teachers.

The guiding question of the study is as follows: How does the mediation of generative artificial intelligence affect the epistemic appropriateness of the math tasks designed by teachers in continuing education? The study examines changes in the structure of the tasks and, at the same time, the decisions through which participants accept, reject, or modify the proposals generated by the tool. Thus, the analysis focuses on both the instructional product and the professional reasoning that accompanies its reformulation.

The objective of this chapter is to characterize this impact by analyzing the relationship between technological mediation, the quality of the mathematical knowledge promoted, and teachers' reflection processes. The approach combines EOS tools with evidence gathered during a continuing education experience in which participants designed tasks, interacted with GAI, and compared versions before and after technological mediation.

The chapter is organized into three sections: first, it reviews task design and epistemic appropriateness; next, it describes the training process and compares initial and mediated versions; finally, it interprets the changes in relation to didactic thinking and the teacher's role.

Thus, the IAG is always analyzed in relation to the mathematical task, the review criteria, and the decisions regarding reformulation.

The contribution lies in articulating technological innovation and didactic foundations. Recent studies show that IAG can support the revision of task instructions when explicit suitability criteria exist (Pochulu and Font, 2025). However, the generated output does not in itself constitute a pedagogical decision: mathematical validation, suitability for the group, and final selection remain the teacher's responsibility.

Theoretical Foundations and Challenges in the Design of Mathematical Tasks from the Ontosemiotic Approach and Epistemic Didactic Suitability

The training of mathematics teachers does not merely convey content; it also shapes ways of selecting, representing, and validating that knowledge in teaching situations. Emmanuele (n.d.) emphasizes the importance of studying the epistemological conceptions that underlie the transmission of mathematical knowledge, while Pochulu and Rodríguez (2012) bring together theoretical approaches that allow us to interpret this training from different frameworks within mathematics education. From this perspective, the issue of school assignments cannot be reduced to their format alone. An assignment prompt expresses a specific conception of what it means to do mathematics and of the practices students are expected to employ in order to learn it.

The design of assignments therefore has an epistemological dimension. It is important not only how mathematics is taught, but also which meanings are selected, which relationships are made visible, and which forms of argumentation are recognized as valid. Godino (2024) argues that the EOS allows for the analysis of mathematical activity by focusing on systems of practices and the objects that emerge from them. In a task, these decisions are reflected in the language used, the required concepts and properties, the available procedures, the representations that can be articulated, and the arguments that justify a solution.

The Ontosemiotic Approach to Mathematical Knowledge and Instruction (EOS), developed by Godino, Batanero, and Font (2003), offers a robust conceptual framework for analyzing this complexity. This approach proposes understanding mathematics as a social practice in which meanings are constructed and communicated through semiotic systems, in interaction with institutional norms and specific contexts. From this perspective, mathematical objects are not isolated entities, but rather constructions that emerge from practices involving languages, concepts, properties, procedures, and arguments.

One of the most significant contributions of the EOS is the concept of ontosemiotic configuration, which allows us to describe the internal structure of mathematical tasks in terms of the objects and processes that are mobilized. From this perspective, a task is not simply a statement, but a network of relationships that links different components of mathematical knowledge. For example, an activity that requires solving a proportionality problem involves not only operations but also an understanding of the concept of proportion, the interpretation of the context, the selection of representations, and the justification of the results obtained.

However, in educational practice, this complexity is often reduced. Many tasks are limited to indicating the procedure to follow, eliminating the need to interpret, decide, or argue. This phenomenon, which can be termed the algorithmic reduction of mathematical knowledge, involves a simplification of mathematical practice that affects the quality of learning. As Godino

et al. (2006) point out, this situation reduces the diversity of mathematical objects at play and limits students' ability to develop meaningful understanding.

Didactic appropriateness broadens the analysis through epistemic, cognitive, interactional, mediational, affective, and ecological dimensions (Godino, 2011). This study prioritizes the epistemic dimension, without isolating it from the context: a mathematically rich task may lose its viability if it ignores prior knowledge, resources, or institutional conditions. Appropriateness thus functions as a framework for judgment rather than a mechanical checklist.

The epistemic facet focuses on the representativeness and coherence of the mathematical meanings made available to students. Its analysis considers concepts, procedures, properties, languages, problem situations, and arguments, as well as the relationships established among them. Beltrán-Pellicer and Giacomone (2018), in a graduate-level study, show that working with appropriateness criteria helps develop a more structured professional reflection on practice. For the present study, this idea is relevant because the comparison of tasks is not limited to indicating whether one version is "better," but rather to specifying which components change and what reasons allow for the evaluation of those changes.

Reflecting on epistemic appropriateness involves, in the words of Font et al. (2010), asking whether the mathematics being taught is "good mathematics." This question goes beyond the formal correctness of the content to focus on its relevance and educational potential. In this sense, a task can be formally correct and yet pedagogically weak if it does not promote understanding or reflection.

The difficulty arises when the design relies primarily on habits acquired through experience rather than on tools that make decision-making criteria explicit. Teachers' prior conceptions of mathematical knowledge can influence what is emphasized, omitted, or considered sufficient in a task (Emmanuele, n.d.). Hence, professional development requires spaces where teachers can revisit their own instructions, recognize assumptions, and compare them with conceptual frameworks. A task then ceases to be merely a tool for eliciting a response and becomes evidence for analyzing how learning is being organized.

In this context, the incorporation of digital technologies has been proposed as a way to transform teaching. However, recent research has shown that the use of technology, on its own, does not guarantee improvements in educational quality (Montenegro, 2022). Technology can even reinforce traditional practices if used instrumentally that is, without reflection on its impact on the knowledge being constructed.

IAG allows for the production and reformulation of content through natural-language instructions. Pochulu (2025) highlights its usefulness for creating and adapting math problems. This productivity expands planning, but also the necessary decisions: an output can serve as a draft or an alternative, and its didactic value depends on subsequent revision.

From an ontosemiotic perspective, AIG outputs can be interpreted as provisional configurations of languages, concepts, procedures, properties, and arguments. The problem is that verbal coherence does not guarantee mathematical coherence. Pochulu and Font (2025) point out that suitability criteria provide a framework for critically reviewing prompts reformulated with IAG and justifying decisions for improvement. Therefore, in this chapter, the tool is not considered the author of a finished task: it produces material that the teacher subjects to analysis before incorporating it into a teaching proposal.

A task may appear more rich in content while still maintaining low cognitive demand. Ramírez Bogantes and Mejía Luna (2026) distinguish between instrumental uses of IAG and more complex learning. Therefore, it is not enough to simply add context or open-ended questions: it must be verified whether the student interprets relationships, chooses strategies, connects representations, and justifies answers.

The educational use of AI, therefore, requires deliberate mediation. Mollick and Mollick (2023) recommend that the user retain control over and evaluate the generated responses; Luckin (2023) similarly argues that integrating AI into schools requires pedagogical knowledge and professional judgment to decide when, for what purpose, and under what conditions to use it. In task design, this mediation involves reviewing errors, adjusting complexity, verifying representations, eliminating unnecessary information, and ensuring that the task instructions align with the learning objective.

Based on these considerations, an analytical assumption not a causal hypothesis is adopted: mediation with IAG may be associated with favorable changes in epistemic appropriateness when the teacher uses EOS criteria to examine and reformulate the proposals. The qualitative study seeks to characterize these changes and understand the decisions that accompany them. It does not aim to demonstrate that the tool produces generalizable improvements, but rather to identify how certain components of the tasks are reorganized within the educational experience under analysis.

Continuing education allows us to observe how professional experience and new conceptual frameworks are integrated. Sureda et al. (2023) show that in-service mathematics teachers interact with IAG in different ways depending on their purposes and the materials provided. It is therefore important to analyze not only the resulting output but also how the teacher formulates, interprets, and modifies the proposal.

Task design can become an activity that can be analyzed using explicit criteria. The following are examined: the coherence between the objective, content, and instructions; the representativeness of meanings; representations; cognitive demands; and opportunities for argumentation. These dimensions, linked to the EOS systematized by Godino (2024), reveal decisions that would otherwise remain implicit.

The integration of EOS and GAI allows us to distinguish superficial changes from transformations in the mathematical structure of the task. Technology expands the range of alternatives; the teacher interprets, validates, and contextualizes them based on didactic criteria.

Mediation of Generative Artificial Intelligence in the Instructional Design of Mathematical Tasks: Methodological Process and Results

In this study, GAI was incorporated into the design and review process, not as an autonomous task generator. The analysis compared initial and mediated versions along with the decisions recorded during the interaction, in line with in-service teacher training experiences (Sureda et al., 2023).

The study followed a qualitative, descriptive, and formative evaluation approach, suitable for interpreting situated productions and decisions without estimating causal effects (Hernández Sampieri et al., 2010). The organization of the work and the intentional selection of participants

were also based on criteria for qualitative educational research described by Yuni and Urbano (2014).

Participants were teachers in continuing education who were pursuing graduate studies in Basic Education, within the academic field of Mathematics Education. Selection was intentional and based on the participants' willingness to reflect on their own practice and experiment with IAG tools during the training process. The analyzed corpus is not limited to a final response generated by the tool: it includes initial tasks, formulations directed toward IAG, the resulting reformulations, mediated versions, and teachers' reflections associated with decisions to make changes.

The process was organized into related phases. The first phase captured initial conceptions regarding the use of technology and established a starting point. Since this chapter does not present that assessment as a standalone result nor does it incorporate an independent instrument, no generalizable percentages or trends are attributed. The inferences are grounded in the PRAC corpus: tasks, prompts, reformulations, and teacher reflections.

The next phase introduced the principles of the Ontosemiotic Approach and the notion of didactic suitability as tools for reviewing the tasks. The purpose was not to add theoretical terminology to the participants' work, but rather to provide criteria with which they could justify their decisions. Godino's (2024) recent systematization of the Ontosemiotic Approach (EOS) made it possible to organize the analysis around the mathematical objects and processes employed and the quality of the meanings proposed in each version.

In a third phase, the teachers developed mathematical tasks without technological mediation, which established a starting point for the comparative analysis. These tasks revealed recurring characteristics, such as the predominance of closed-ended exercises, an emphasis on the application of procedures, and a lack of reasoning or diversity in representations. This stage proved essential for bringing to light the implicit conceptions that guided the instructional design.

Mediation with IAG served as the comparative focus. Teachers primarily used ChatGPT to reformulate assignments, compare alternatives, and correct proposals. The prompts were retained as evidence of the intentions and criteria communicated. Following Mollick and Mollick (2023), the generated output was treated as input subject to supervision, not as a final product.

The PRAC organized the comparison between the initial version, interaction with IAG, the mediated version, ontosemiotic analysis, and teacher reflection. The material was examined using content analysis (Bardin, 2011) and EOS categories to identify objects, processes, representations, and arguments (Godino et al., 2007). Table 1 summarizes the sequence and the evidence considered.

Table 1. *Analytical Sequence of the Case Collection and Analysis Protocol (PRAC)*

Time of Analysis	Purpose	Evidence Considered
Initial version of the task	To identify the instructional design developed by the teacher without support from IAG.	Statement of the task, objective, content, required procedures, and assessment criteria.
Interaction with IAG	Identify the type of request made to the tool and the guidance provided by the teacher.	Prompts, reformulations, requests for improvement, and explicitly stated criteria.
Mediated version	Evaluate the changes made to the task.	Changes in context, language, representation, reasoning, and work sequence.
Ontosemiotic analysis	Characterize mathematical objects and processes present in both versions.	Languages, concepts, properties, procedures, arguments, and problem situations.
Teacher Reflection	Understand the professional evaluation of the experience.	Narratives, comments, justified decisions, and acknowledged difficulties.

Note: Methodological synthesis adapted for the presentation of this research based on Bardin (2011) and Godino et al. (2007).

The results show a greater diversity of representations in various mediated tasks, with the incorporation of graphic, tabular, and verbal elements that expanded the semiotic structure of the activities.

The demand for reasoning also increased: some tasks began to require explanations, justifications, and comparisons of procedures, in contrast to initial versions focused on obtaining answers.

Greater coherence between objectives and activities was also observed. The IAG facilitated the review of what was intended to be taught versus what was required of the student, although each proposal required teacher validation.

Several tasks incorporated more developed everyday or school-based contexts. Their inclusion was relevant only when there was an effective connection between the scenario and the mathematical content.

The IAG also served as a mediator for reflection: comparing alternatives helped identify limitations and explore new design approaches. Its value lay less in the automatic response than in the decisions it prompted.

Limitations persisted: some proposals were too lengthy or complex, and others contained conceptual inaccuracies. These cases required revision and confirmed that the tool does not replace professional knowledge.

Overall, the mediation opened up possibilities for reformulation without producing a uniform trajectory. Some tasks gained representational diversity or argumentation, while others required further corrections. The findings are therefore interpreted as situated transformations of the learning process.

Ontosemiotic Transformations and Epistemic Quality of Mathematical Tasks Mediated by Generative Artificial Intelligence

A comparison between initial tasks and those reformulated using GAI allowed us to identify changes in concepts, procedures, languages, arguments, and problem situations. As Pochulu and Font (2025) argue, the criterion is not how much the wording changes, but rather what mathematical opportunities the new version offers and how its ontosemiotic configuration is modified.

The initial tasks tended to be closed-ended and to specify the procedure to be followed. This structure limited interpretation, decision-making, and argumentation. From the EOS perspective, such a configuration limits the diversity of mathematical objects and processes engaged and restricts the construction of meaning.

One visible transformation was the expansion of representational registers: in contrast to the initial predominance of numerical or symbolic representations, several tasks incorporated verbal language, tables, graphs, or diagrams. Pochulu (2025) identifies reformulation as a potential use of IAG; in this study, it proved valuable when the new representations served a mathematical function.

There was also an increase in prompts aimed at explaining, comparing, or justifying. Pochulu and Font (2025) note that suitability criteria make reformulation with IAG an opportunity for reflection. Here, open-ended questions were valued only when they required real mathematical decisions or arguments.

An open-ended question did not guarantee high cognitive demand. Some reformulations anticipated the procedure or added so many steps that they reduced student autonomy. This result aligns with the tension between efficiency and complex learning described by Ramírez Bogantes and Mejía Luna (2026).

Didactic suitability allowed for the evaluation to be organized by facets and components. Beltrán-Pellicer and Giacomone (2018) demonstrate its educational utility, while Godino (2024) systematizes its foundations. Table 2 adapts these criteria to the analysis of IAG-mediated tasks and identifies risks that require teacher oversight.

Table 2. *Criteria for Analyzing Didactic Suitability in IAG-Mediated Tasks*

Suitability Facet	Analysis Criteria for IAG-Mediated Tasks	Risk to be controlled
Epistemic	Representation of concepts, procedures, properties, arguments, and problem situations.	Algorithmic reduction or incorporation of mathematically imprecise information.
Cognitive	Alignment between task demands, prior knowledge, and	Overload due to excessive instructions or a sudden increase in complexity.

	actual comprehension capabilities.	
Mediational	Appropriateness of resources, formats, timing, and technological tools to facilitate learning.	Ornamental use of technology with no impact on mathematical meaning.
Interactional	Opportunities for discussion, explanation, validation, and feedback between students and the teacher.	Individualized activity that limits mathematical discussion.
Affective	The task's ability to generate interest, confidence, and a willingness to solve problems.	Artificial contexts or instructions that cause anxiety or demotivation.
Ecological	Alignment with the curriculum, grade level, institutional context, and the needs of the environment.	Proposals that are decontextualized or disconnected from actual classroom conditions.

Note: Prepared by the author based on the criteria of the Ontosemiotic Approach described by Godino et al. (2006) and on the application of suitability criteria to didactic analysis developed by Breda and Lima (2016).

In the initial tasks, some concepts appeared to be subordinate to the procedure. The mediated versions tended to make them explicit through definitions, explanations, or examples, although this greater visibility was only useful when it maintained precision and relevance to the mathematical activity.

The generated explanations also required monitoring. Some clarified concepts; others simplified relationships or introduced expressions that needed to be corrected. Pochulu and Font (2025) argue that IAG can strengthen reflection when its outputs are subject to explicit criteria a pattern also observed in these cases.

Contextualization showed similar behavior. Several mediated tasks incorporated more developed school or everyday scenarios, but their relevance depended on whether the context actually modified the mathematical activity. Pochulu (2025) argues that IAG offers flexibility to create and adapt problems; this possibility is useful when the scenario requires interpreting data, establishing relationships, or making decisions. If the narrative can be removed without affecting the procedure, its presence does not in and of itself improve epistemic appropriateness.

From the EOS perspective, quality is recognized in the articulation of components rather than in the accumulation of resources. A relevant context, an additional representation, or a more extensive sequence must justify its presence through the mathematical practice it promotes. Godino (2024) emphasizes analyzing objects, processes, and meanings within the systems of practice where they acquire meaning. This approach made it possible to avoid a superficial reading of the generated versions and to focus the review on the task's internal coherence.

Taken together, the observed transformations allow us to identify patterns of change in the ontosemiotic configuration of mathematical tasks. These patterns reveal a transition from execution-centered structures toward proposals that integrate multiple modes of representation, require reasoning, and promote the conceptual explicitation of knowledge. To systematize these findings, Table 3 presents a summary of the main transformations identified in the mathematical objects and processes involved.

Table 3. *Ontosemiotic transformations observed in mathematical tasks*

Mathematical object/process	Trend in initial tasks	Observed contribution following mediation with IAG
Languages	Predominance of isolated numerical or symbolic expressions.	Greater integration of verbal language, tables, graphs, and mathematical expressions.
Concepts	Definitions that are implicit or loosely connected to the activity.	Greater clarification of the meaning of the content being covered.
Procedures	Emphasis on performing operations or applying rules.	Inclusion of strategy comparison and verification of results.
Arguments	Little demand for justification or explanation.	Questions aimed at explaining, validating, and communicating reasoning.
Contexts	Generic situations or exercises taken out of context.	Scenarios more closely related to school and everyday problems.
Interaction	Activities focused on individual responses.	Greater openness to discussion, social interaction, and feedback.

Note: Author's own synthesis based on a comparative analysis of tasks with and without IAG mediation (Godino et al., 2003; Godino et al., 2007).

Another change occurred in the sequencing. The IAG tended to propose activities with distinct phases of exploration, development, and closure, which in some cases helped organize the progression of the work. The same tool could, however, generate sequences that were too long or result in redundant instructions. The supervision framework proposed by Mollick and Mollick (2023) is useful for interpreting this situation: the tool provides alternatives, but the user must select and adapt those that serve the instructional purpose. In the cases analyzed, the decision regarding length, pace, and complexity remained with the teacher.

The teacher thus acted as a regulator of the design process: he compared options, eliminated elements, adjusted the level of difficulty, and contextualized the proposals. This activity can be interpreted as a form of professional pedagogical analysis. Breda and Lima (2016) show that suitability criteria make it possible to make more explicit the reasons a teacher uses to justify a proposal and its improvement. In the study's case, mediation using IAG highlighted the need to formulate these criteria when faced with a broader set of alternatives.

The observed changes do not justify the claim that every task mediated with IAG achieves superior epistemic suitability. They do, however, allow us to recognize a pattern: when the teacher's revision succeeded in linking representations, concepts, procedures, and arguments to the learning objective, the final version exhibited a richer structure than the initial one. Pochulu and Font (2025) reach a compatible conclusion by highlighting the potential of IAG within a

theoretical framework that supports teacher reflection. The decisive factor is the quality of that mediation.

The opposite interpretation is also necessary. When use was focused on quickly producing a more extensive assignment, the result could retain the same algorithmic structure or increase the workload without adding mathematical complexity. The tension highlighted by Ramírez Bogantes and Mejía Luna (2026) helps interpret these cases and prevents equating efficiency with complex learning. Consequently, GAI expands design possibilities, but the epistemic value of the task is determined by the analysis that connects the technological output with the mathematical practices one wishes to promote.

Teacher Training and the Reconstruction of Pedagogical Thinking in Contexts of Mediation with Generative Artificial Intelligence

The incorporation of GAI into continuing professional development affects more than just the repertoire of available tools. It compels teachers to make explicit criteria that often remain implicit in planning: what they consider a good explanation, when a representation is relevant, what level of support to offer, and what evidence they expect from an argument. Sureda et al. (2023), in their work with in-service mathematics teachers, show that the ways of interacting with GAI vary depending on the purpose and the materials used. This diversity helps us understand professional development as a process of critical appropriation rather than mere technical training.

The graduate-level teacher is in a particularly fertile position for this analysis because they contrast academic knowledge with practices already established in their professional experience. Professional development allows them to revisit everyday decisions and subject them to new interpretive frameworks. In research on the training of mathematics teachers, Emmanuele (n.d.) has highlighted the importance of examining the conceptions involved in the transmission of knowledge, and Pochulu and Rodríguez (2012) demonstrate the diversity of approaches from which this process can be considered. GAI is integrated here as a new object of reflection within a pre-existing training issue: how to justify teaching decisions.

One of the study's most significant findings is that interaction with generative artificial intelligence fosters processes of self-awareness regarding one's own teaching practice. Participants not only used the tool to generate assignments but, in the process of comparing initial and revised versions, began to identify patterns in their approach to designing activities. This identification allowed them to recognize trends such as the predominance of closed-ended exercises, the absence of argumentation, or the limited diversity of representations.

This process of recognition constitutes a turning point in teacher education, as it enables a shift from intuitive practice to reflective practice. In the words of Bolívar et al. (2001), reflection on experience is a fundamental element in the construction of professional knowledge, insofar as it allows for the reconstruction of the meaning of pedagogical action. In the case of this study, artificial intelligence acted as a catalyst for this process, facilitating the visualization of alternatives and the re-evaluation of previous decisions.

The narrative accounts produced by the teachers during the training process constitute significant evidence of this transformation. In them, the participants describe the experience of interacting with the AIG as an opportunity to "see themselves from the outside," which allowed them to analyze their decisions with greater critical distance. This idea of artificial intelligence as

a "pedagogical mirror" encapsulates the role that technology plays in this context: it not only generates content but also provides teachers with a reflection of their own practice, which can be analyzed and improved.

This process of self-analysis is directly linked to the development of pedagogical thinking, understood as the teacher's ability to make informed decisions about the design, implementation, and evaluation of learning activities. In this sense, pedagogical thinking is not limited to the application of strategies but involves a deep understanding of teaching and learning processes, grounded in theoretical frameworks and reflection on practice.

Interaction with the IAG contributed to this exercise because each reformulation required a clearer definition of the request, followed by an evaluation of the response. A vague prompt might yield a generic activity; a request with clearer pedagogical criteria facilitated comparison but did not eliminate the need for review. Mollick and Mollick (2023) describe this principle as keeping the human user in the loop. In teacher training, this approach requires justifying why a proposal is retained, revised, or discarded, and transforms the use of technology into an opportunity to make professional judgment visible.

The EOS provided the language through which these decisions could be discussed. Pedagogical suitability made it possible to move from general assessments such as "the assignment is better" or "it is more complete" to questions about representativeness, demand, interaction, resources, and contextual fit. Beltrán-Pellicer and Giacomone (2018) document the educational value of these criteria in a graduate-level course focused on reflection on teaching practice. In the process analyzed, their utility lay precisely in providing categories to justify the changes made following interaction with the IAG.

The experience also necessitates broadening the concept of teachers' digital competence. Simply navigating an interface or drafting a prompt is insufficient when the tool produces content that may contain errors, oversimplifications, or decisions ill-suited to a specific group. Luckin (2023) approaches educational AI from the perspective of teachers' professional practice and emphasizes the need to understand its possibilities and limitations. Digital competence, within this framework, includes the ability to verify content, decide when the tool adds value, and recognize situations in which it is best to do without it.

This professional judgment combines disciplinary, pedagogical, and technological knowledge. Teachers need to detect a mathematical inaccuracy, assess whether a representation aids understanding, adjust the level of complexity, and anticipate the conditions for application. Luckin (2023) places these decisions at the heart of responsible AI integration, and Mollick and Mollick (2023) add the need to critically evaluate the outputs rather than delegating judgment to the system. Continuing professional development is essential because it allows teachers to practice this review using specific materials and to discuss the rationale behind each adjustment.

The Ecuadorian context adds a requirement for relevance. The 2017–2018 national report on educational outcomes identified mathematics as the subject area with the lowest scores among those evaluated a finding that reinforces the need to support innovation with well-founded instructional decisions (National Institute for Educational Assessment, 2018). At the same time, the national curriculum organizes mandatory learning and requires alignment with specific levels and progressions (Ministry of Education of Ecuador, 2016). A task generated by IAG, therefore, must be reviewed in light of the mathematical content, the grade level, and the specific conditions in which it will be used.

The experience carried out in the Master's Program in Basic Education at the Bolivarian University of Ecuador served as a space for formative research. Participants did not limit themselves to learning commands; they compared versions, reviewed criteria, and discussed the effects of their decisions on the task. This dynamic aligns with the observations of Sureda et al. (2023) in processes involving in-service mathematics teachers: the value of IAG lies in situated interaction and the opportunity to scrutinize the outputs, not in a single mode of use.

Likewise, comparing tasks designed without technological mediation to those reformulated with GAI support constitutes a powerful strategy for professional development. This exercise makes it possible to highlight changes in the quality of instructional design, identify progress, and recognize areas requiring improvement. Beyond the final product, what matters is the analytical process that unfolds, since it is through this process that pedagogical knowledge is constructed.

The ethical dimension is an integral part of this professional judgment. Generative systems can provide incorrect information, reproduce biases, obscure the source of an answer, or encourage the sharing of data that should not be uploaded to external platforms. Holmes et al. (2022) had already identified these risks among the educational implications of artificial intelligence, and Luckin (2023) applies them to the decisions that teachers must make. Training therefore requires explicit verification practices, transparency regarding the use of the tool, and careful handling of the information used during the interaction.

The presence of AI-based tools does not diminish teachers' responsibility; it makes it more visible. The tool can propose alternatives at a speed that is difficult to match manually, but it does not, on its own, know the group's history, the specific curriculum, or the pedagogical decisions that underpin a lesson sequence. Mollick and Mollick (2023) emphasize that human supervision is a prerequisite for responsible educational use. In the mathematics design analyzed, this supervision involved validating meanings, adjusting instructions, and deciding which version was defensible based on disciplinary and pedagogical criteria.

Teacher training mediated by GAI can thus be understood as a process of reconstructing didactic thinking rather than as instrumental training. Technology creates a new space for comparison, but reflection is strengthened when there are categories for interpreting what changes and reasons for justifying those changes. Through this combination, the tool expands the repertoire of possibilities while the teacher retains epistemological authority over the knowledge they intend to teach.

From the Automation of Design to the Epistemological Mediation of Mathematical Knowledge in Generative Artificial Intelligence Contexts

The results allow us to interpret the integration of GAI through a tension between automation and epistemological mediation. Automation means quickly obtaining a prompt, a variant, or a sequence; mediation involves deciding what knowledge is constructed through that proposal and why a particular version is pedagogically defensible. Ramírez Bogantes and Mejía Luna (2026) propose a similar tension when distinguishing the instrumental use of GAI from processes oriented toward complex learning. This distinction helps contextualize the findings: speed was useful, but it was not the criterion used to evaluate the tasks.

Automation can reduce production time and expand the repertoire of alternatives advantages that explain much of the interest in generative systems. The problem arises when that efficiency supplants pedagogical analysis. Mollick and Mollick (2023) propose maintaining an active

evaluation of AI outputs to avoid complacency in the face of plausible answers, errors, or biases. In a math task, this scrutiny involves verifying the content, anticipating the procedures the prompt will elicit, and determining whether the student will need to interpret and reason or simply follow a predetermined path.

Epistemological mediation starts with another question: what mathematical practices does the task make possible? The EOS allows us to describe them through the objects and processes that emerge from the activity and the relationships between languages, concepts, properties, procedures, and arguments (Godino, 2024). Designing, then, does not consist of producing a text that "looks like" a problem, but rather of organizing a situation in which certain practices can be developed and validated. The IAG enters this process as a source of alternatives that must be subjected to professional criteria.

In the cases studied, the potential of IAG became most evident when participants used the response to compare, question, and redesign. This dynamic is similar to that described by Pochulu and Font (2025), where suitability criteria guide the critical analysis of prompts reformulated using IAG. This similarity does not imply that the tool itself produces a better result; rather, it indicates that the interaction can become an opportunity for reflection if the teacher has a framework for evaluating what they receive.

This shift in the relationship with technology constitutes one of the most significant contributions of the research. Artificial intelligence ceases to be a tool for generating tasks and becomes a means for reflecting on teaching. In this sense, its value lies not only in the answers it generates but also in the questions it raises. What kind of mathematical knowledge is being promoted? What relationships are established between concepts? What opportunities for reasoning are offered to the student? These questions allow us to shift the focus from the product to the process, strengthening the teacher's pedagogical thinking.

Nor did the potential manifest itself uniformly. Some responses reproduced procedure-centered structures, even when they included more elaborate language or seemingly authentic scenarios. Others included too many instructions and ended up limiting student autonomy. Ramírez Bogantes and Mejía Luna (2026) offer a way to interpret this result without falling into a technocentric interpretation: an improvement in efficiency or presentation does not necessarily equate to more complex learning. Critical mediation was necessary to distinguish between these levels.

Epistemological monitoring encapsulates an important part of this mediation. It consists of reviewing mathematical coherence, the relevance of representations, the level of complexity, the role of context, and the quality of the required arguments. Pochulu and Font (2025) show that suitability criteria allow this review to be grounded in explicit justifications. In the study, monitoring was not applied as a rigid checklist at the end of the process, but rather as a way to revisit decisions while the task was being reformulated.

From the EOS perspective, the diversity of responses generated can be understood as an expansion of the space of possible configurations. Generative AI quickly combines objects and records, but the relevance of these combinations can only be judged within a specific mathematical practice. Godino (2024) emphasizes the relationship between meanings, practices, and institutional contexts. Therefore, a variant was not selected because it was more extensive or novel, but because it allowed for better organization of the expected mathematical activity and could be justified in light of the learning objectives.

Based on the findings, it is possible to propose an interpretive model that synthesizes the integration of generative artificial intelligence into the design of mathematical tasks. This model is organized around five key stages: the instructional intent, the formulation of the request to the tool, the generated output, the ontosemiotic evaluation, and the teacher's professional decision. Each of these stages reflects an instance of mediation in which the teacher intervenes to guide, adjust, and validate the design process.

This model helps us understand that artificial intelligence does not replace the teacher's work but rather makes it more complex. Each stage of the process requires conscious intervention to ensure coherence between learning objectives and the proposed activities. In this sense, the teacher acts as an epistemological mediator who regulates the relationship between technology and knowledge.

The model also highlights risks that arise during the design phase. A solution path may be excessively long, introduce a sudden increase in difficulty, or accumulate resources that increase the workload without enriching the mathematical meaning. Pochulu (2025) emphasizes the flexibility of AI-based problem-solving tools in adapting problems; this advantage requires an equivalent review of the proposal's feasibility. The teacher must adjust the sequence to the available time, prior knowledge, and the class's level, ensuring that formal novelty does not become an obstacle.

Homogenization poses another risk. If similar instructions are used and recurring structures are accepted, different tasks may end up sharing the same pattern of context, questions, and conclusion. Mollick and Mollick's (2023) recommendation to actively evaluate the generated responses helps prevent this dependency. Teacher creativity remains essential for introducing real-world problems, varying forms of representation, and determining when a structure proposed by the tool does not align with the instructional intent.

Ethical challenges are embedded in the decision-making model itself. The reliability of information, transparency regarding the use of AI-generated content, and data protection are not issues external to the design, because they determine what materials can be entered into the tool and how the tool's outputs are validated. Holmes et al. (2022) warn about the educational implications of delegating decisions to AI systems, while Luckin (2023) places the responsibility for informed integration on teachers. Epistemological mediation therefore includes a dimension of professional responsibility.

Within this framework, artificial intelligence can be understood as a tool that expands teachers' possibilities, provided its use is grounded in sound pedagogical criteria. Educational innovation does not lie in the technology itself, but in teachers' ability to integrate it critically and reflectively into their practice.

The shift from automation to epistemological mediation does not imply rejecting efficiency, but rather placing it in its proper context. AIG can accelerate drafting, variation, or exploration, but pedagogical decision-making requires evaluating which mathematical practices each proposal promotes. The tension between instrumental use and complex learning described by Ramírez Bogantes and Mejía Luna (2026) serves as a reminder that the ultimate criterion is not how much the tool produces, but what kind of intellectual activity the teacher organizes based on those possibilities.

Viewed from this perspective, the IAG offers an opportunity to rethink task design without making technology the focus of the explanation. The most consistent finding of this chapter is

that the quality of the mediated version depends on the relationship between the generated alternatives, the analysis criteria, and the teacher's decisions. The tool broadens the range of options; the teacher determines which ones can support meaningful mathematical practice and what modifications are necessary to make them viable in their context.

Conclusions

The objective of this chapter was to characterize the impact of IAG mediation on the epistemic appropriateness of mathematics tasks designed by teachers in continuing education. The comparative analysis identified transformations in some versions: the use of representations was expanded, there were more requests for explanation and justification, and the coherence between objectives and instructions was revised. These changes are not interpreted as an automatic effect of the tool. They occurred within a training process in which participants analyzed, selected, and adjusted the responses generated based on didactic criteria.

Epistemic appropriateness proved particularly useful for distinguishing a superficial reformulation from a transformation with mathematical consequences. Adding context, expanding the instructions, or incorporating a table was not sufficient to rate a task positively. The review had to determine whether these elements altered the meanings at stake, articulated representations, opened up decision-making possibilities, and required justification. In cases where such articulation was achieved, the mediated version offered a richer configuration; when it was not, it was necessary to intervene again on the proposal.

The most significant educational contribution emerged during the comparison process. The IAG offered alternatives in response to which the teacher had to explicitly state what they expected from the task and why they accepted or rejected a modification. This process brought to light decisions that might otherwise remain implicit in standard design. Reflection arose not only from the technological response but also from the contrast between that response, the ontosemiotic framework, and the participants' professional experience.

The accounts and decisions gathered during the process allow us to understand the IAG as a resource for evaluating one's own practice. Its usefulness stemmed from the ability to view a task from a different perspective, identify limitations, and test adjustments. It is important to keep this conclusion within the scope of the study: the research involved a purposeful selection of graduate-level instructors and work produced within a specific academic setting. The findings describe this process and should not be generalized as causal evidence for any educational context. The EOS provided the framework through which it was possible to justify the assessments made. The notion of appropriateness and in particular its epistemic aspect allowed us to examine the mathematical quality of the tasks without adopting a position of prior acceptance or rejection of the technology. This use of the theoretical framework reinforces an idea that runs throughout the chapter: the integration of IAG acquires pedagogical value when the technological decision is subordinated to questions about meanings, practices, and learning.

The study also revealed specific limitations. Some IAG responses introduced conceptual inaccuracies, others proposed sequences that were too lengthy, and in certain cases, homogeneous design patterns emerged. Such situations required teacher correction and confirm that a plausible solution cannot be treated as ready-to-use classroom material. The review process must ensure disciplinary accuracy, alignment with the educational level, and relevance to the context in which the task will be implemented. Hence, the teacher's role is not limited to drafting better instructions for the tool. Their primary responsibility is to maintain

epistemological and didactic judgment regarding what is being taught. IAG can expand options and accelerate certain stages of the design process, but the selection of meanings, the adjustment of cognitive demands, and the validation of arguments remain professional decisions. This condition constitutes both the limitation and, at the same time, the most important educational opportunity offered by technological mediation.

Looking ahead, it would be beneficial to study similar experiences at other educational levels, with groups from diverse professional backgrounds, and using methods that allow for a more detailed documentation of the evolution of the criteria used by teachers. It will also be necessary to compare types of tasks and modes of interaction with AI to identify which conditions foster deeper reflection. These lines of inquiry would allow us to broaden the scope of the findings without losing the traceability between student work, pedagogical decisions, and context.

The discussion about the future of mathematics education cannot be reduced to deciding whether or not to use artificial intelligence. The pedagogical question is more demanding: how to integrate a productive tool without ceding to it the responsibility for defining the quality of knowledge. The cases analyzed show that such integration is possible when the generation of knowledge becomes a subject of examination and the teacher has criteria to justify each decision. This chapter's contribution lies in this articulation between technology, theory, and practice.

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Teacher Training Mediated by Learning Analytics: A Methodological Strategy for a Master's Program in Pedagogy in Digital Environments

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Introduction

Learning analytics (LA) has become increasingly important in digital educational settings, especially with the expansion of online learning and learning management systems. Its fundamental purpose is to transform the data generated during students' interactions with platforms, resources, and activities into useful information for pedagogical decision-making. This capability makes it possible to identify patterns of participation, learning difficulties, academic risks, and the need for timely support, with the aim of guiding more relevant and personalized interventions (Pan et al., 2024).

However, the availability of data does not, in and of itself, guarantee an improvement in teaching and learning processes. The usefulness of AA depends on teachers' ability to select relevant indicators, interpret data in a contextualized manner, and translate findings into evidence-based pedagogical decisions. Furthermore, the use of educational data raises ethical challenges related to privacy, transparency, algorithmic fairness, and student involvement in interpreting the information they generate (Ngulube and Ncube, 2025; Wang, 2024).

Assessment Analytics (AA) can be understood as the process of measuring, collecting, analyzing, and presenting data about students and the contexts in which they learn, with the aim of understanding and optimizing learning and educational environments (An et al., 2025; Nguyen, 2024; Zhang and Chen, 2025). From this perspective, its value is recognized in supporting the early identification of difficulties, guiding feedback processes, promoting self-regulated learning, and personalizing learning pathways (Fernández-Morante et al., 2022; Gašević et al., 2015; Viberg et al., 2018). In particular, adaptive analytics approaches make it possible to track student performance and anticipate the likelihood of academic success (Suharti et al., 2024).

This study adopts the definition proposed by López-Fernández et al. (2024), who conceive of AA as an eclectic procedure for measuring, processing, analyzing, synthesizing, and interpreting data from the educational community, using techno-pedagogical resources, as well as qualitative and quantitative research and analysis methods. This conception is relevant because it avoids reducing EA to mere technical automation and highlights its connection to a comprehensive understanding of educational processes.

In turn, this perspective is complemented by critical approaches that question the supposed neutrality of data and algorithms. Selwyn (2022) emphasizes that the incorporation of artificial intelligence and educational analytics must be accompanied by reflection on the social, pedagogical, and ethical implications of such technologies. Similarly, Manca and Ranieri (2015) highlight the need to consider the agency of individuals and sociocultural contexts in technology-

mediated processes. Knox (2025) warns that an overly broad understanding of artificial intelligence in education can dilute the criteria necessary to guide concrete pedagogical actions. Recent reviews document the contribution of artificial intelligence-based tools to academic innovation, while also underscoring the need for critical and contextualized use (Younas et al., 2025). Therefore, it is necessary to balance the technical potential of these tools with a critical, contextualized educational application that is oriented toward student well-being.

The Challenge of Teacher Training

The growing digitization of higher education has positioned AI as a strategic resource for improving instructional planning, monitoring student performance, and making evidence-based decisions. Pan et al. (2024) note that AI-supported interventions make it possible to identify patterns of academic risk early on and design differentiated support strategies. Meta-analytic evidence confirms that AA-based interventions have positive effects on student learning outcomes (Liu et al., 2025). However, several studies agree that a significant proportion of teachers lack sufficient training to understand, interpret, and use the data generated by virtual platforms pedagogically (Carvalho et al., 2022; Howard et al., 2021a).

Teacher training in data analytics requires moving beyond a purely instrumental view focused on software management to promote data literacy with pedagogical meaning. This implies that teachers learn to formulate relevant questions, select indicators, recognize biases, interpret visualizations, and make ethically responsible educational decisions. Carvalho et al. (2022) argue that participatory design and sustained support strengthen teachers' analytical agency, as they enable teachers to integrate available information into their reflective practice.

Contemporary training models converge on the need for active, flexible, and contextualized approaches. González-Rivera (2022) highlights the importance of methodologies based on real-world problems and cases to facilitate the transfer of learning to professional practice. Siyam et al. (2025) propose a framework for teacher professional development to evaluate and strengthen the integration of technology into classroom practice. Oñate-Álvarez et al. (2025) propose training pathways grounded in AI and interactive platforms, while Quiroz-Valdez et al. (2025) emphasize the need to align methodological strategies with the characteristics of the training program and the institutional conditions for implementation.

Likewise, Zambrano-Zambrano et al. (2025) point out that the sustainability of analytics-based teaching strategies depends not only on technological availability but also on their institutional integration and shared pedagogical leadership. Along these lines, Núñez-Rojas et al. (2022) highlight the relationship between teacher training, curriculum management, and competency assessment. Campos-Posada et al. (2022) emphasize that professional development must encompass both disciplinary content and the educational sciences, as well as the digital competencies required in contemporary teaching practice. Complementarily, Reiban , and Álava Mieles (2017) highlight that strengthening teachers' research competencies promotes a more rigorous use of evidence in educational practice.

In the Master's Program in Pedagogy in Digital Environments at the Bolivarian University of Ecuador, a need was identified to strengthen teachers' competencies related to the use and interpretation of educational data. Although teachers use digital platforms in their academic work, the systematic use of AA tools remains limited. This situation limits the ability to provide differentiated feedback, identify learning difficulties in a timely manner, and adapt teaching strategies to students' needs.

Based on this issue, the following research question was formulated: How can we contribute to the training of teachers in the Master's Program in Pedagogy in Digital Environments in the use of learning analytics to improve the teaching-learning process in virtual environments?

Accordingly, the objective of the research was to design a methodological strategy for implementing teacher training mediated by learning analytics in the Master's Program in Pedagogy in Digital Environments at the Bolivarian University of Ecuador.

Design, Methods, and Ethics

A mixed-methods research approach was employed, integrating quantitative and qualitative procedures to gain a comprehensive understanding of teachers' level of preparedness in learning analytics and to inform the design of the methodological strategy. The quantitative component allowed for the description of trends related to knowledge, frequency of use, perceived usefulness, and attitudes toward learning analytics. The qualitative component contributed to understanding the experiences, barriers, and training needs expressed by the participants.

The design was non-experimental and cross-sectional, as data were collected at a single point in time without manipulation of variables. The study had a descriptive-applied scope, since the diagnostic results were used to inform an intervention proposal aimed at strengthening teachers' analytical competencies.

The population consisted of faculty members in the Master's Program in Pedagogy in Digital Environments at the Bolivarian University of Ecuador. Intentional non-probabilistic sampling was used, with inclusion criteria based on experience in online teaching, active participation in the master's program, and voluntary willingness to participate in the research. The final sample consisted of 12 teachers, aged between 30 and 55, with graduate-level education and diverse professional backgrounds in education, technology, and academic administration.

Two instruments were used to collect data. The first was a structured questionnaire with 24 items, organized into four dimensions: conceptual knowledge of AA; use of tools and data sources; pedagogical interpretation of indicators; and attitudes toward innovation and training. A five-point Likert scale was used, ranging from 1, corresponding to "never," to 5, corresponding to "always."

The second instrument was a semi-structured interview designed to explore teachers' perceptions of the barriers, challenges, institutional conditions, and potential of AA to improve teaching, academic monitoring, and the personalization of learning.

Validation and Reliability Table

Table 1. *Results of the content validation and internal consistency analysis of the learning analytics questionnaire*

Evaluated indicator	Statistical procedure	Result	Interpretation Criteria	Interpretation
Clarity of the items	V. Aiken	0.87	$V \geq 0{,}80$	The items are written clearly and comprehensibly
Relevance of the items	V. Aiken	0.90	$V \geq 0{,}80$	The items are relevant to the dimensions being assessed

Consistency of the items	V. Aiken	0.89	$V \geq 0{,}80$	There is consistency between the items, indicators, and objectives
Overall content validity	Overall Aiken's V	**0.89**	$V > 0{,}85$	Adequate agreement between the instrument's content and the research objectives
Internal consistency of the 24-item questionnaire	Cronbach's alpha	**0.89**	$\alpha \geq 0{,}80$	High internal consistency and adequate reliability of the questionnaire

Note: Content validation was conducted through expert judgment by specialists in digital education, research methodology, and educational data analysis. Internal consistency was estimated using Cronbach's alpha for the 24 items in the questionnaire. An Aiken's V value greater than 0.85 indicates an adequate level of agreement among experts; a Cronbach's alpha of 0.89 indicates high reliability of the instrument.

The instruments were administered in four stages:

1. Design and validation of the instruments, along with an initial awareness-raising session on the relevance of AA in higher education.
2. Administration of the questionnaire via a digital form and conduct of interviews via videoconference, after obtaining informed consent for participation, recording, and transcription.
3. Processing of quantitative data using descriptive statistics in Jamovi, considering frequencies, percentages, and measures of central tendency. Qualitative data were analyzed using inductive thematic coding.
4. Integration and triangulation of the quantitative and qualitative findings to inform the design of the methodological strategy.

The qualitative analysis identified emerging categories related to digital competencies, data literacy, the pedagogical interpretation of indicators, institutional barriers, and attitudes toward innovation. To strengthen the credibility of the process, triangulation of methods, sources, and researchers was applied. In addition, results were shared with the participants, who reviewed the general interpretations derived from their responses.

The ethical principles of educational research and the institutional regulations of the Bolivarian University of Ecuador were adhered to. Participation was voluntary; anonymity, confidentiality, and the use of information exclusively for academic purposes were guaranteed. Digital records were stored in institutional spaces with restricted access, and interviews were coded to preserve the participants' identities.

Findings of the Assessment

The questionnaire results revealed a gap between teachers' favorable attitude toward educational innovation and their actual level of proficiency with learning analytics tools and procedures. In general, there was a low frequency of systematic use of educational data to guide

pedagogical decisions, particularly in identifying participation patterns, providing individualized monitoring, and developing differentiated interventions.

Table 2. *Descriptive results of the diagnostic assessment on learning analytics among teachers in the Master's Program in Pedagogy in Digital Environments*

Dimension or indicator	Main finding	Interpretation
Systematic use of learning analytics tools	More than 80% reported not using them regularly in their practice	Low level of AA integration
Knowledge of indicators of participation, progress, and academic risk	Six of the teachers 50% reported having difficulties in this area	Requires conceptual and practical strengthening
Pedagogical interpretation of data generated in the LMS	Only two teachers that is, 16.66% do not use the platform's results	Descriptive use predominates over decision-making
Use of data for differentiated feedback	Four teachers use the DATASEP grading system.	Need to develop evidence-based pedagogical interventions
Willingness to participate in training and innovation	11 out of 12 teachers (91.67%) are willing to adapt their teaching practices by leveraging the strengths of AA	High openness to change and professional development

Note: Compiled by the author based on a questionnaire administered to 12 teachers.

The main quantitative evidence indicates that more than 80% of teachers did not systematically use AA tools in their teaching practice. This result suggests that, although digital platforms and data derived from academic activity are available, these resources are not regularly used as inputs for planning, monitoring, and evaluating students.

In contrast, 11 of the 12 teachers expressed a willingness to incorporate educational innovations and participate in training processes, which amounts to 91.67%. This favorable attitude is a key prerequisite for implementing the strategy, as it shows that the main challenges are not related to resistance to change, but rather to needs for training, support, and the structuring of institutional procedures.

Analysis of the interviews allowed us to organize the findings into four main categories: limitations in data literacy; predominantly technical use of platforms; need for pedagogical support; and openness to innovation.

Table 3. *Categories Emerging from the Qualitative Analysis*

Category	Interpretive evidence	Implications for the strategy
Insufficient data literacy	Teachers acknowledge difficulties in selecting indicators, interpreting reports, and relating data to pedagogical decisions	Incorporate training in reading and interpreting indicators
Technical use of platforms	Moodle and other tools are primarily used to distribute materials, manage assignments, and record grades	Encourage the shift toward the analytical and pedagogical use of data

Need for support	Practical guidance, instructional resources, and opportunities for consultation are needed during implementation	Include mentoring, communities of practice, and ongoing monitoring
Assessment of the innovation	Participants express interest in tools that provide better insight into student progress	Use this favorable attitude as a starting point for implementation

Note: Prepared by the author based on inductive thematic coding of the semi-structured interviews.

The qualitative findings are consistent with the specialized literature. Howard et al. (2021b) argue that initial and continuing teacher education often does not include sufficient training in interpreting educational data. Similarly, Ferguson et al. (2022) argue that the mere existence of data does not guarantee its pedagogical use, as methodological frameworks, institutional time, support, and specific decision-making competencies are required.

The results suggest that the central challenge does not lie exclusively in the use of digital tools. The fundamental challenge lies in developing pedagogical-analytical competence that enables teachers to formulate questions about learning, select relevant data, interpret patterns, recognize potential biases, and design timely interventions. Jovanović et al. (2021) note that analytics should be geared toward improving students' learning conditions and not limited to measuring or predicting performance.

Methodological Strategy

The methodological strategy is based on the results of the diagnostic assessment and is aimed at progressively strengthening teachers' competencies for the critical, ethical, and pedagogical use of AA in the Master's Program in Pedagogy in Digital Environments. Its implementation proposes a sequence of seven interconnected phases ranging from the identification of needs to reflection on results and continuous improvement.

The strategy is based on the following principles:

- Contextual relevance, by responding to the characteristics of UBE's Master's in Pedagogy in Digital Environments.
- Active participation, by involving faculty in needs analysis, activity design, and evaluation of results.
- Situated learning, by using real data and situations generated in the online courses.
- Ethics and data protection, by ensuring confidentiality, transparency, and the responsible pedagogical use of information.
- Continuous improvement, by incorporating systematic mechanisms for monitoring, reflection, and adjustment.

Table 4. *Structure of the methodological strategy for teacher training mediated by learning environments*

Phase	Purpose	Main Activities	Outputs or Evidence	Evaluation Indicators
1. Assessment and Awareness-Raising	Identify competencies and raise awareness of the value of AA	Application of assessment tools, initial session, expectations forum	Baseline and needs assessment	Participation, diagnostic results, and systematized expectations
2. Training on Tools	Developing initial technical skills	Workshops on Moodle, Google Forms, Power BI, Jamovi, and Jupyter	Guides, worked examples, and practical projects	Task performance and self-assessment
3. Designing interactive activities	Generating pedagogically useful data	Designing activities in Moodle, Kahoot, Quizizz, and Educaplay	Instructional sequences and rubrics	Consistency between activity, evidence, and indicator
4. Data collection and analysis	Interpreting evidence of interaction and performance	Reviewing records, creating dashboards, and generating reports	Participation, progress, and alert reports	Quality of interpretation and relevance of indicators
5. Continuous Feedback	Turning data into timely support	Personalized messages, tutoring, forums, and formative feedback	Feedback plans and intervention records	Timeliness, clarity, and perceived usefulness
6. Personalized Learning	Designing differentiated support based on needs	Identification of profiles, support pathways, and reinforcement activities	Individual or group support plans	Tracking progress and participation
7. Reflection and Continuous Improvement	Evaluate the process and adjust the strategy	Reflection meetings, analysis of results, and communities of practice	Improvement report and continuity agreements	Changes Implemented and Sustainability of the Practice

Note: Prepared in-house, tailored to the needs of the assessment conducted

Phase 1. Diagnosis and Awareness-Raising

The purpose of the first phase is to identify the level of teacher readiness and promote a shared understanding of the pedagogical value of AA. Instruments are used to explore knowledge, practices, needs, and attitudes. In addition, an awareness-raising session is held to present case

studies of how educational data is used for monitoring, providing feedback, and personalizing learning.

Activities include administering questionnaires and conducting interviews, sharing preliminary findings, and using a virtual forum or collaborative Padlet board to gather teachers' expectations, questions, and suggestions. The output of this phase is a needs assessment that establishes a baseline for designing the training.

Phase 2. Training in Analytics Tools

The second phase focuses on developing basic and intermediate technical skills. Practical workshops are held on the pedagogical use of Moodle, Google Forms, Power BI, Jamovi, and Jupyter. The activities prioritize the analysis of real or simulated data from online courses, ensuring that learning is not limited to a theoretical explanation of the tools.

Teachers create practical outputs, such as forms for collecting information, basic tracking dashboards, descriptive analyses, and participation reports. They also design guides, video tutorials, and reference materials to facilitate self-directed learning and help resolve challenges during implementation.

Assessment includes practical exercises, checklists, and post-workshop surveys. Both technical proficiency and the ability to relate the data obtained to specific pedagogical decisions are evaluated.

Phase 3. Design and Implementation of Interactive Activities

The third phase aims to create learning experiences that, in addition to promoting participation, generate relevant data for pedagogical monitoring. Teachers design interactive activities using Moodle, Kahoot, Quizizz, Educaplay, and collaborative online projects.

Each activity must be linked to learning objectives, expected evidence, participation indicators, and assessment criteria. In this way, the data collected takes on pedagogical significance and is not limited to reports on access or connection time.

Evaluation is conducted by reviewing the designed instructional sequences, analyzing the coherence between activities and indicators, and assessing the reports generated by the platforms.

Phase 4. Data Collection and Analysis

In this phase, teachers are trained to collect, organize, and analyze information from Moodle logs, forms, interactive activities, and assessments. The training focuses on indicators such as access frequency, forum participation, assignment submissions, assessment results, progress by unit, and interaction patterns.

Teachers learn to use spreadsheets, Jamovi, Jupyter, and visualization tools to convert the data into comprehensible reports. It is recommended to hold periodic data review sessions, during which teachers ask questions such as: Which students show the lowest participation? In which activities are difficulties concentrated? Which groups require additional feedback? What instructional adjustments can be derived from the data?

The evaluation considers the quality of the reports produced, the relevance of the selected indicators, and the ability to interpret the data in light of actual educational needs.

Phase 5. Ongoing Feedback to Students

The fifth phase focuses on translating analytical findings into timely support measures. Mechanisms for individual and group feedback are established through messages on Moodle, forums, virtual tutoring sessions, and comments on assignments.

Feedback should be clear, respectful, focused on improvement, and linked to observable evidence of performance. It is not merely a matter of reporting a grade, but of explaining strengths, areas of difficulty, and specific recommendations for progress. Instructors can use simple visualizations, rubrics, and progress reports to help students understand their academic standing.

Evaluation is conducted through student perception surveys, reviews of the timeliness of interventions, and analyses of trends in participation and performance.

Phase 6. Personalizing Learning

The sixth phase uses the results of data analysis to identify individual and group needs. Based on patterns of progress, participation, and performance, teachers design differentiated support pathways, reinforcement activities, additional resources, and specific tutoring sessions.

Personalization should not be understood as a rigid classification of students; rather, it is a flexible process of support. Decisions must be continuously reviewed and should avoid any form of stigmatization, labeling, or unjustified automation. The information generated by AA should complement not replace the teacher's pedagogical judgment.

The outputs of this phase may include support plans, remedial activities, adapted resources, and monitoring records. Evaluation is based on individual progress over time, completion of proposed activities, and students' assessments of the support they have received.

Phase 7. Reflection and Continuous Improvement

The final phase ensures the sustainability of the strategy. Monthly pedagogical reflection meetings are held, during which teachers analyze the results obtained, share experiences, identify best practices, and propose adjustments.

It is recommended to use collaborative documents, communities of practice, and institutional repositories to document the experiences and resources produced. The results of each cycle should inform planning for the next academic period, so that AA is progressively integrated into the master's program's work culture.

The evaluation of this phase considers the preparation of improvement reports, the implementation of specific changes, the continuity of communities of practice, and the incorporation of AA into the processes of planning, evaluation, and academic support.

The findings of the assessment confirm that the challenge of incorporating AA into university teaching practice is not limited to technological availability. The existence of platforms, records, and indicators does not automatically translate into evidence-based pedagogical decisions. The low frequency of use of analytical tools observed among the participating group highlights the

need for training processes that integrate technological, methodological, interpretive, and ethical competencies.

These findings align with those of Howard et al. (2021b), who note that teacher training often has limitations in developing the competencies necessary for digital teaching. Similarly, Carvalho et al. (2022) argue that teachers' analytical agency requires participatory and contextualized training approaches in which faculty can interpret information related to real-world teaching situations.

The high level of openness to innovation identified in the study represents a significant opportunity. Lomba-Portela et al. (2022) maintain that resistance to educational change is linked to personal, organizational, and cultural factors; therefore, teachers' openness to professional development enhances the possibility of implementing progressive transformations. However, this openness must be accompanied by appropriate institutional conditions: time for training, technical support, methodological guidance, data protection protocols, and spaces for collaboration among teachers.

The proposed approach addresses these needs through a seven-phase sequence that integrates assessment, training, implementation, analysis, feedback, customization, and reflection. Its value lies in promoting a shift from the instrumental use of digital tools toward evidence-based pedagogical practice. In this regard, Riofrío Orozco (2025) highlights the transformative power of assessment in learning environments when it is grounded in systematic information about student performance. Consequently, formative assessment is conceived as a means to better understand learning processes and guide timely interventions, not as a mechanism for surveillance, classification, or automated decision-making.

Conclusions

The research enabled the design of a methodological strategy to strengthen teacher training mediated by learning analytics in the Master's in Pedagogy in Digital Environments program at the Bolivarian University of Ecuador. The proposal addresses the needs identified in the diagnostic assessment, primarily the limited use of LA tools, difficulties in pedagogically interpreting data generated in virtual environments, and the need for context-specific and ongoing training.

The results reveal a gap between teachers' favorable attitude toward innovation and their level of preparedness to use educational data in planning, monitoring, and providing feedback. This gap demonstrates that the integration of learning analytics requires moving beyond purely technological training to incorporate competencies in data literacy, pedagogical interpretation, digital ethics, and evidence-based decision-making.

The methodological strategy organizes the training process into seven interconnected phases: assessment and awareness-raising; training in analytics tools; design of interactive y activities; data collection and analysis; ongoing feedback; personalized learning; and reflection and continuous improvement. This structure facilitates a gradual, participatory, and contextualized process in which teachers develop the ability to translate interaction and performance data into relevant pedagogical actions.

The proposal acknowledges that data does not replace the teacher's professional judgment. On the contrary, it must be interpreted in light of contextual knowledge, the diversity of students' learning paths, and the principles of ethics, privacy, transparency, and educational justice. In this

sense, AA is conceived as a tool to support pedagogical reflection and strengthen academic support in virtual environments.

Finally, the future implementation of the strategy should include an impact assessment using indicators such as teacher participation, the development of analytical skills, the quality of feedback, the incorporation of personalized interventions, and student perceptions. This will make it possible to evaluate the proposal's effectiveness and make the necessary adjustments to consolidate an institutional culture of responsible and pedagogical use of educational data.

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Beyond State Transfers: An Analysis of Funding Sources in Ecuadorian Municipalities with Smaller Populations

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Introduction

Decentralization is one of the fundamental pillars of modern public administration, as it transfers powers, responsibilities, and resources to local governments with the aim of bringing public decision-making closer to the needs of citizens. However, the effectiveness of this model depends on the financial capacity of local governments to exercise their powers autonomously and sustainably. In Ecuador, the Decentralized Autonomous Municipal Governments (GAD-M) are responsible for territorial planning, the provision of local public services, the execution of infrastructure projects, and the promotion of cantonal development. However, the fulfillment of these functions is contingent upon the availability of sufficient financial resources.

This issue is particularly acute in municipalities with smaller populations. These local governments operate in areas with narrow tax bases, limited economic activity, and institutional constraints that hinder their ability to generate their own revenue. As a result, most rely heavily on transfers from the central government to fund their operations and implement local development projects.

This financial dependence creates a series of risks for municipal sustainability. Delays in transfers affect institutional liquidity, disrupt budget planning, and limit the implementation of projects aimed at improving the population's living conditions. At the same time, the lack of revenue diversification reduces the capacity to adapt to scenarios of fiscal uncertainty.

Given this context, the following research question arises: What are the main sources of financing used by Ecuadorian municipalities with smaller populations, and what limitations and opportunities do they present for strengthening their financial autonomy and capacity for local development?

Consequently, the objective of this chapter is to analyze the composition, dependence, limitations, and potential of the funding sources used by Ecuadorian municipalities with smaller populations, identifying strategies that contribute to strengthening their financial sustainability and their capacity to drive territorial development processes.

The main contribution of this chapter lies in demonstrating that the financing problems faced by small municipalities stem from limited diversification of economic sources, as well as from factors related to institutional capacities, administrative modernization, project management, and the use of alternative financing mechanisms.

Financial Diversification and Local Autonomy

Financial diversification refers to the capacity of local governments to expand their revenue portfolio, thereby reducing dependence on a single source of funding. From this perspective, a diversified financial structure increases institutional resilience and strengthens fiscal sustainability (Moyado, 2011).

In municipalities with smaller populations, diversification is particularly important due to the vulnerability caused by dependence on state transfers; in Ecuador, 72% of these municipalities finance more than half of their budgets with state resources, while in 36% of cases, these transfers account for more than 75% of institutional revenue.

This situation reflects a limited capacity to generate their own revenue and high vulnerability to delays or fluctuations in national allocations. Consequently, the financial sustainability of these local governments depends on advancing diversification strategies that strengthen their own revenue collection and reduce dependence on external resources.

When municipal revenues come primarily from external sources, any delay or reduction in their disbursement can jeopardize the continuity of services and projects.

However, the reality is that municipal local governments rely on traditional revenue sources as a mechanism to contribute to annual local government budgets, as reflected in the results of a study conducted among 26 financial directors of municipalities with smaller populations that fall under the jurisdiction of Ecuador's 24 provinces.

Traditional Sources of Funding in Ecuadorian Municipalities with Smaller Populations

Although Ecuador's regulatory framework recognizes various financing options, administrative practice shows that small municipalities continue to base a significant portion of their financial strategies on property taxes, business licenses, fees, and special improvement levies, as these are instruments whose administration falls directly under the municipal authorities established in the Organic Code on Territorial Organization, Autonomy, and Decentralization (COOTAD), (National Assembly of Ecuador, 2010).

However, evidence from Latin America shows that most local governments maintain high levels of dependence on resources transferred by central governments. This reality has been extensively studied because it creates vulnerabilities associated with changes in national fiscal policies, delays in transfers, and limitations on long-term investment planning. In municipalities with smaller populations, these difficulties tend to intensify due to the limited economic and tax base within their territories.

In this context, the research findings demonstrate that tax revenues continue to represent the primary tool for fiscal strengthening available to local governments. Although their relative weight within municipal budgets is limited, financial directors acknowledge that municipal taxes remain the most accessible and controllable instruments for increasing the availability of institutional resources.

The specialized literature classifies municipal tax revenues into three broad categories: taxes, fees, and special levies (Olano, 2025). Taxes constitute fiscal obligations imposed by local

governments without an immediate and direct consideration to the taxpayer (Unda and Moreno, 2015)

Notable examples within this category include urban and rural property taxes, municipal business licenses, taxes on property transfers, and other levies established by current legislation. Fees, on the other hand, are charged for specific services provided by the municipality, while special contributions are linked to particular benefits obtained by taxpayers as a result of public works or urban improvements carried out by the local administration.

Among all these sources, property taxes and municipal business licenses emerge as the most significant instruments for local finances. The results show that 62.9% of finance directors consider these sources to constitute a relatively solid revenue base for their municipalities, while nearly one-third hold a less favorable view.

This variation demonstrates that revenue-raising capacity does not depend exclusively on the existence of taxes, but rather on the institutional capacity developed to administer them. Municipalities that have strengthened their territorial information systems, updated their property registries, and improved their tax control mechanisms tend to achieve better revenue collection results. Conversely, local governments with limited administrative structures face greater difficulties in capitalizing on the potential of these funding sources.

Table 1. *Perceptions of the Soundness of the Main Traditional Sources of Funding*

Source of funding	Level of favorable perception
Property taxes and business licenses	62.9%
Municipal fees	62.9%
Special improvement taxes	48.1%

Source: Author's own analysis based on research conducted on Ecuadorian municipalities with smaller populations.

Municipal fees show a similar pattern. 62.9% of respondents consider them a significant source of institutional revenue, although their role is perceived primarily as supplementary. This is because revenue from municipal services typically depends on local demand and the ability of residents to pay. Consequently, while fees contribute to local financing, they are unlikely to become the primary basis for fiscal sustainability in small municipalities.

From an economic perspective, fees play an important role because they allow for a more direct link between the services provided and the resources collected. However, their growth potential is limited by factors such as service coverage, demographic structure, and social resistance to rate increases. These constraints explain why municipalities continue to prioritize property taxes within their financial strengthening strategies.

On the other hand, special improvement levies show significantly lower levels of acceptance and utilization. Only 48.1% of financial directors consider this source to make a significant contribution to institutional finances, while 40.7% hold a negative view.

This finding is particularly relevant because it reveals the existence of a potentially underutilized source of funding. Special improvement levies make it possible to recoup part of the investments made in public infrastructure when these investments generate a direct increase in the value of

the properties that benefit from them. However, their implementation often faces obstacles related to the technical complexity of determining individual benefits, the need for specific regulatory frameworks, and the social resistance that typically arises in response to this type of charge.

The limited implementation of special contributions also reflects institutional weaknesses related to municipal financial planning and management. In many cases, local governments lack up-to-date technical information that would allow them to adequately quantify the benefits derived from completed projects, hindering the effective application of this tax mechanism.

Beyond the differences observed among the various sources of funding, the results reveal a common thread: local tax revenues continue to account for a small proportion of the total municipal budget. According to the data collected, in 59.2% of the municipalities analyzed, revenue from taxes, fees, and special contributions does not exceed 15% of the institutional budget. Only 11.1% of local governments report a share exceeding 40%.

Table 2. *Share of Tax Revenue in the Municipal Budget*

Share of local taxes	Percentage of municipalities
Less than 15%	59.2%
Between 16% and 40%	29.7%
More than 40%	11.1%

Source: Author's own analysis based on research findings.

These data confirm that traditional sources constitute an important pillar of local finances, but are insufficient to guarantee high levels of financial autonomy. Faced with this reality, municipal governments have developed strategies aimed at strengthening revenue collection. One of the most significant strategies involves updating tax ordinances. The research found that over the past three years, 70.3% of municipalities made changes to their taxes, fees, or levies through regulatory reforms initiated by the current administrations.

The changes were concentrated primarily in property taxes and municipal business licenses, which accounted for 37% of the updates made, followed by municipal fees at 32%.

This trend indicates that local governments continue to view traditional revenue sources as the most viable options for increasing their own revenue generation. However, regulatory updates alone do not guarantee substantial improvements in revenue collection capacity. Studies on municipal tax administration indicate that financial strengthening requires complementing regulatory reforms with actions aimed at modernizing administrative processes, improving information systems, and strengthening the relationship between the tax administration and taxpayers (Anchundia and Aguayo, 2024).

In this regard, one of the most significant advances identified in the research is the incorporation of digital collection mechanisms. Approximately half of the municipalities studied have implemented online payment systems or agreements with financial institutions to facilitate tax payments. Among those municipalities that adopted these tools, 75% report improvements in revenue collection levels and administrative efficiency, as shown in Table 3.

Table 3. *Perception of the Impact of Digitalization on Municipal Revenue Management*

Implementation of digital mechanisms	Results Observed
Municipalities with digitization	75% report improvements in revenue collection and efficiency
Main effects	- Strengthening of local revenue. - Reduction in delinquent payments. - Simplification and facilitation of tax compliance

Source: Author's own analysis based on research conducted in Ecuadorian municipalities with smaller populations

The significance of this finding lies in the fact that it demonstrates how technological innovation can contribute to strengthening local finances. Digitization reduces operating costs, simplifies procedures, shortens processing times, and facilitates tax compliance by citizens. Furthermore, it enhances the transparency of processes and creates better conditions for monitoring and controlling tax obligations. (Cobos, 2021).

Finally, an analysis of traditional sources of financing reveals a cross-cutting factor that influences municipalities' revenue collection performance: cadastral updates. The results show that 55.5% of municipalities have up-to-date cadastral records, while 40.7% acknowledge significant delays in this area.

Table 4. *Cadastral updates in small municipalities.*

Percentage of municipalities	Interpretation
55.5%	Municipalities with an updated property tax assessment registry.
40.7%	Municipalities that do not have an up-to-date land registry.
3.8%	Undefined responses or unspecified categories.

Source: Author's own analysis based on research conducted on Ecuadorian municipalities with smaller populations

The importance of this variable lies in the fact that the property registry forms the basis for property taxes, which are considered the primary source of local revenue for most local governments. The inclusion of property appraisals in this process allows municipal authorities to understand the value of properties in different areas, which can influence decisions on where to locate public services and make informed decisions about where it is most appropriate to invest in infrastructure (Intriago, Palma, Mendoza, Cedeño, and Bravo, 2024).

When cadastral records contain incomplete information, outdated appraisals, or deficient records, the ability to collect taxes is significantly reduced (Anderson, Giertz, and Shimul, 2022). Consequently, the prospects for moving toward greater financial autonomy also diminish.

In summary, the findings lead to the conclusion that traditional revenue sources continue to play a central role within the financial structure of Ecuadorian municipalities with smaller populations. However, their ability to strengthen financial sustainability is constrained by institutional factors related to cadastral updates, the modernization of tax collection processes, administrative efficiency, and the capacity to continuously adapt tax regulations to the needs of the local area.

Far from being obsolete instruments, taxes, fees, and special levies retain significant potential to strengthen municipal fiscal autonomy; however, their effective utilization requires profound institutional modernization that will allow the transformation of revenue-collection capacity into a true tool for sustainable local development.

Penalty Mechanisms and Recovery of Tax Liabilities

Municipal tax administration depends not only on the existence of revenue collection instruments but also on the institutional capacity to promote timely compliance with tax obligations. Within this context, penalty mechanisms serve as complementary tools designed to discourage delinquency and strengthen taxpayers' payment culture. Fines, surcharges, and interest for noncompliance are part of the set of instruments that local governments can use to protect their revenues and reduce levels of delinquent accounts. In fact, 83.9% of financial directors acknowledge that their institutions impose fines or charge interest when there are outstanding tax obligations or violations of administrative provisions. This indicates that local governments have regulatory mechanisms in place to strengthen tax discipline and promote greater accountability among taxpayers. However, the mere existence of financial penalties does not guarantee a substantial improvement in revenue collection levels. The evidence suggests that, in many municipalities, fines and interest serve primarily as instruments of administrative pressure rather than as an effective source of revenue recovery. Although they help establish incentives for tax compliance, their financial impact is often limited by problems related to case tracking, collection management, and the operational capacity of the institutions responsible for enforcing these penalties.

Table 5. *Perceptions Regarding the Imposition of Fines for Tax and Administrative Noncompliance*

Percentage of municipalities	Interpretation
9.7%	Very low level of enforcement of penalties for tax and administrative noncompliance.
6.5%	Low level of enforcement of penalty mechanisms.
25.7%	Moderate perception regarding the imposition of fines and interest.

58.1%	A favorable view of the use of penalties for noncompliance with tax and administrative obligations predominates.

Source: Author's own analysis based on research conducted in Ecuadorian municipalities with smaller populations

The distribution of responses shows that there is a predominantly positive view of the use of these instruments. More than half of respondents consider penalties to be a routine part of municipal financial management, while levels of disagreement are considerably lower. However, this favorable perception should be analyzed with caution, since the formal imposition of a penalty does not necessarily imply the effective recovery of the amounts owed.

One of the main problems identified relates to existing limitations in the processes for notifying and following up with delinquent taxpayers. In many municipalities, difficulties persist in maintaining individualized and ongoing communication with citizens who have outstanding obligations, a situation that reduces the effectiveness of collection efforts and limits the institutional capacity to convert amounts owed into actual revenue.

From a fiscal sustainability perspective, the results suggest that fines and interest should be viewed as complementary tools within a broader strategy for strengthening the tax system (add citation). Their effectiveness depends, to a large extent, on the existence of up-to-date tax rolls, modern information systems, efficient notification mechanisms, structured collection processes, and sufficient technical capacity to manage delinquent accounts. Without these elements, the deterrent effect of penalties is significantly reduced, and their contribution to municipal financial autonomy remains limited.

Innovative Sources of Financing in Ecuadorian Municipalities with Smaller Populations

The growing fiscal uncertainty faced by local governments has made the diversification of funding sources one of the main strategies for strengthening financial sustainability and reducing dependence on state transfers.

In municipalities with smaller populations, this need takes on even greater significance due to the structural limitations that characterize these areas, including a narrow tax base, limited economic dynamism, and institutional capacities that are often insufficient to generate their own revenue on a sustained basis.

The literature on local public finance recognizes that fiscal autonomy also depends on the institutional capacity to access alternative financing mechanisms capable of supplementing traditional sources of revenue. In this context, tools such as international cooperation, public-private partnerships (PPPs), inter-institutional collaboration schemes, access to external financing, and capacity building for project formulation represent opportunities to expand local governments' scope of action and strengthen their financial resilience.

However, the findings of this research indicate that the incorporation of these innovative sources remains limited in Ecuadorian municipalities with smaller populations, even though the national legal framework recognizes the ability to manage international cooperation and develop collaboration schemes with private actors as exclusive powers of municipal governments. The effective use of these mechanisms remains exceptional and is constrained by multiple institutional factors.

International Cooperation as an Instrument of Territorial Development

Over the past few decades, international cooperation has evolved from a welfare-based approach toward approaches focused on institutional strengthening, sustainability, and territorial development (Agudelo, 2021). At the municipal level, this form of financing represents an opportunity to access financial resources, technical assistance, knowledge transfer, and organizational strengthening without relying exclusively on allocations from the central government.

In Ecuador, the Organic Code on Territorial Organization, Autonomy, and Decentralization expressly recognizes the management of international cooperation as a responsibility of municipal governments (National Assembly of Ecuador, 2010). This provision grants local governments (GADs) the ability to establish direct links with multilateral organizations, cooperation agencies, foreign governments, international foundations, and development finance institutions.

However, the results show that this legal authority does not necessarily translate into a well-established institutional practice. Most of the municipalities participating in the study reported that they had not carried out any projects funded by international cooperation over the past three years, indicating limited use of this potential source of resources.

Among the few municipalities that do have experience with international cooperation, the mechanisms identified are concentrated primarily in three categories.

Table 6. *Modalities of international cooperation identified in the sample*

Modality	Number of mentions
Non-repayable grants	5
Loans or repayable financing	4
Specialized technical assistance	2

Source: Author's own analysis based on research applied to Ecuadorian municipalities with smaller populations

The predominance of non-repayable resources is particularly relevant from the perspective of financial sustainability, as it allows development projects to be implemented without creating new debt obligations for local governments. This type of financing is an especially valuable alternative for municipalities with limited fiscal capacity, as it enables the implementation of projects with a territorial impact without increasing future budgetary pressures.

On the other hand, the presence of international loans indicates that some municipalities have begun to explore more sophisticated financing mechanisms. However, this type of transaction requires rigorous financial management, as access to repayable funds can jeopardize fiscal sustainability when there is insufficient revenue to support the commitments made.

Institutional Capacities for Accessing International Cooperation

The limited participation of municipalities in projects funded by international organizations cannot be explained solely by external factors. The results show that one of the main weaknesses lies in the institutional capacities of local governments themselves.

Table 7. *Municipal Participation in International Cooperation Projects Over the Past Three Years*

Identified Situation	Result
Municipalities that report no participation in international cooperation projects	75%
Municipalities reporting some form of participation	25%

Source: Author's own analysis based on research conducted on Ecuadorian municipalities with smaller populations

The research showed that most municipalities lack specialized units responsible for managing international cooperation. This situation prevents the development of systematic processes aimed at identifying calls for proposals, drafting proposals, establishing relationships with cooperating agencies, and conducting technical and financial monitoring of approved projects.

From an organizational perspective, the absence of formal structures means that cooperation-related activities are typically handled on an ad hoc basis by officials who already have other administrative responsibilities. As a result, international cooperation management becomes an occasional and reactive activity rather than a permanent strategy for financial strengthening.

Even in those municipalities where specific units or personnel are in place, the results reveal significant limitations related to staff technical training. Although some competencies in project formulation and proposal monitoring have been identified, there is no consistent level of professionalization that would allow for successful competition for international resources. This reflects a gap that must be bridged, given that human capital is the most valuable intangible asset within the organization (Espinoza, Chumpitaz, and Espinoza, 2026).

This situation confirms that the sustainability of international cooperation depends both on the existence of institutional structures and on the development of specialized capacities in areas such as project management, international negotiation, financial administration, and monitoring and evaluation of results.

Added to this is the absence of institutional policies and formal guidelines to direct the management of international cooperation. Most municipalities lack internal regulatory frameworks that define priorities, procedures, and specific responsibilities regarding the pursuit of external resources.

Consequently, international cooperation appears more as an occasional opportunity than as a strategy integrated into municipal planning and financing systems.

Main Barriers to Accessing International Resources

The findings identify three major obstacles that limit local governments' ability to take advantage of international cooperation opportunities.

The first barrier is the shortage of qualified personnel. This factor appears repeatedly in the responses from financial directors and highlights the difficulty local governments have in forming teams specialized in the formulation and management of international projects.

The second limitation relates to access to information. Several municipalities note that they lack permanent mechanisms for learning about calls for proposals, funding opportunities, and specific programs promoted by international organizations. This situation creates a competitive disadvantage compared to organizations that have specialized structures to continuously monitor such opportunities.

Finally, the administrative requirements imposed by many cooperating agencies represent a significant barrier for small local governments. The need to submit technical studies, financial evidence, monitoring systems, and institutional counterparts often exceeds the available capacities in numerous municipalities, according to the consensus reflected in the results of this study.

Table 8. Main Challenges in Accessing International Cooperation

Identified challenge	Observed incidence rate
Lack of specialized staff	High
Limited information on job openings	High
Complex administrative requirements	High
Financial counterpart requirements	Medium-High
Limited institutional capacity	High

Source: Author's own analysis based on research conducted in Ecuadorian municipalities with smaller populations

Taken together, these findings suggest that low municipal participation in international cooperation projects stems from both internal and external factors. Insufficient organizational capacity, combined with increasingly complex requirements from funding agencies, creates a gap that limits access to resources that could be strategic for local development.

Public-Private Partnerships as an Alternative Financing Mechanism

Alongside international cooperation, public-private partnerships have gained prominence in contemporary public management processes. These arrangements allow for the pooling of resources, capabilities, and knowledge from both the public and private sectors to finance, build, operate, or maintain projects of collective interest (ECLAC, 2020).

From a theoretical perspective, PPPs are mechanisms that facilitate the mobilization of private capital toward infrastructure projects, public services, and territorial development, thereby partially reducing the financial pressure on public administrations. Their importance lies in the fact that they allow for an expansion of investment capacity without relying exclusively on fiscal resources.

Despite their potential benefits, the results show that most Ecuadorian municipalities with smaller populations have not implemented public-private partnerships over the past three years. The cases identified are limited and correspond to isolated experiences that have not yet reached a sufficient level of institutionalization to be considered a routine source of financing.

Table 9. *Recent Development of Public-Private Partnerships in Smaller Municipalities*

Observed Situation	Approximate percentage
Municipalities that did not develop PPPs in the past three years	75.0%
Municipalities that have developed PPPs	25.0%
Total	100.0%

Source: Compiled by the authors based on information provided by the chief financial officers.

However, the analysis takes on particular significance when examining the assessments made by those municipalities that have indeed implemented projects under this model.

The prevailing perception among this group is favorable, especially regarding the ability of PPPs to attract investment toward public infrastructure projects. Financial officials believe that this mechanism has helped mobilize resources that would have been difficult to finance exclusively through municipal budgets.

Likewise, the results show positive assessments regarding the effects of PPPs on job creation, the provision of public services, and local economic development. These findings suggest that public-private partnerships are not merely financial instruments but also mechanisms capable of stimulating broader processes of territorial development.

Table 10. *Perceived Benefits of PPPs in Municipalities That Implemented Them*

Identified benefit	Level of assessment
Investment in local infrastructure	High
Job creation	High
Regional development	High
Improvement of public services	High
Institutional modernization	High

Source: Prepared by the authors based on information provided by the financial directors.

Barriers to the Expansion of PPPs in Small Municipalities

Although the identified experiences show favorable results, the research demonstrates that significant barriers to expanding this model within Ecuadorian municipalities with smaller populations persist.

Budgetary constraints appear to be the most frequently cited difficulty by financial directors. Paradoxically, even though PPPs seek to supplement public resources through private participation, their implementation requires initial investments, technical studies, specialized consulting, and the financial capacity to meet counterpart commitments.

A second obstacle relates to insufficient regulatory clarity. Several municipalities believe that the current legal framework recognizes the possibility of implementing PPPs but does not always provide precise operational tools to facilitate their development. This situation creates legal uncertainty for both local governments and potential private investors.

The third limitation is associated with institutional technical capabilities. Many municipalities lack professionals specialized in financial structuring, contract management, risk assessment, and project negotiation. This shortfall significantly reduces the chances of developing sustainable partnerships that are attractive to the private sector.

Table 11. *Main Barriers to Implementing Public-Private Partnerships*

Identified challenge	Percentage
Budgetary constraints	34.9%
Lack of regulatory clarity and legal instruments	27.9%
Insufficient institutional technical capacity	18.6%
Mistrust among stakeholders	11.6%
Other difficulties	7.0%
Total	100.0%

Source: Compiled by the author based on the grouped responses from the CFOs.

Finally, the study identifies issues related to institutional trust. Perceptions of risk, uncertainty regarding the stability of projects, and weak relationships between public and private actors limit the willingness to develop long-term collaborative arrangements.

Financial Diversification and Territorial Development

The analyzed results support the conclusion that diversifying funding sources is a fundamental challenge for Ecuadorian municipalities with smaller populations. The limited involvement of international cooperation and public-private partnerships demonstrates that there is still considerable dependence on traditional sources and state transfers. However, the evidence also shows that the successful initiatives undertaken by some municipalities reveal real opportunities to move toward more diversified financial models. International cooperation has enabled to access financial resources and technical assistance, while PPPs have helped mobilize private investment for projects of local interest.

Consequently, the main limitation does not appear to be the lack of alternative financing mechanisms, but rather insufficient institutional capacity to take advantage of them. Strengthening specialized technical teams, creating international cooperation units, updating regulations, professionalizing project management, and developing strategic planning frameworks emerge as essential conditions for consolidating innovative sources of financing capable of reducing dependence on state transfers and strengthening the financial sustainability of local governments.

Conclusions

The analysis confirms that Ecuadorian municipalities with smaller populations remain highly dependent on state transfers, a situation that significantly limits their financial autonomy and their ability to promote sustainable territorial development processes. Although Ecuador's institutional framework recognizes broad powers for municipal governments, the effective availability of resources remains insufficient to guarantee the full exercise of those powers.

The results also show that traditional sources of own-source revenue particularly property taxes, business licenses, and municipal fees continue to play an important role within the local financial structure. However, their capacity to sustain municipal development remains limited due to factors such as a narrow tax base, delinquent payments, administrative deficiencies, and delays in updating the property tax rolls. Consequently, own-source revenues account for a relatively small share of municipal budgets, which restricts the possibilities for achieving greater levels of fiscal autonomy. Municipal financial sustainability depends not only on the availability of economic resources but also on the strengthening of institutional capacities. Municipalities with stronger technical and administrative capabilities are better positioned to update property registries, modernize collection processes, improve tax collection, and access alternative sources of financing. This relationship demonstrates that institutional strength is a strategic factor in expanding local financial autonomy and overcoming the structural limitations associated with population size. Likewise, the findings highlight the limited use of innovative financing mechanisms such as international cooperation, public-private partnerships, and the economic utilization of municipal assets. Although these tools have yielded positive results in cases where they have been implemented, their use remains rare among the municipalities studied. The main constraints identified include a lack of specialized staff, the absence of specific technical units, insufficient knowledge of financing opportunities, and regulatory or administrative difficulties in structuring more complex initiatives. Another relevant aspect relates to the vulnerability caused by delays in state transfers. The prevailing view among financial directors confirms that these delays affect budget planning, project implementation, and the operational stability of local governments. This situation reinforces the need to promote strategies aimed at diversifying revenue sources and reducing municipalities' exposure to external factors beyond their control.

Finally, it is concluded that the diversification of funding sources should be viewed as a comprehensive strategy for institutional strengthening and not merely as a means of generating new revenue. Strengthening tax administration, modernizing the property registry, digitizing processes, providing technical training for officials, and developing alternative financing mechanisms are complementary elements that can help build local governments that are more resilient, sustainable, and capable of responding to the needs of their communities.

From this perspective, the financial autonomy of Ecuadorian municipalities with smaller populations will depend both on their capacity to generate their own resources and on their

ability to efficiently and strategically manage the financing opportunities available at the national and international levels.

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Cognitive Skills and Emerging Technologies: Implications for 21st-Century Education

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Introduction

The intersection between human cognition and technological development has taken on special relevance in contemporary pedagogy, particularly in the context of the knowledge society. In this context, education is shaped as a dynamic ecosystem in which emerging technologies mediate the processes of accessing, processing, and constructing knowledge (Salamanca Garay & Badilla Quintana, 2020; Ruiz-Velasco Sánchez & Garduño Teliz, 2021). In particular, artificial intelligence presents new forms of interaction between human and technological capabilities; from the perspective of human-AI hybrid adaptivity, these can complement one another to foster more adaptive educational experiences (Holstein et al., 2020).

From this perspective, the development of cognitive skills is grounded in ecosystemic approaches that integrate the personal, social, and technological dimensions of learning. 21st-century skills are not conceived as isolated competencies, but rather as interdependent elements within complex educational systems, where students and teachers construct knowledge. This approach views digital education as a hybrid human-technological ecosystem, in which the competencies of students and teachers, digital resources, connectivity, and institutional strategies interact to foster relevant and adaptive learning in contexts of accelerated digital transformation, according to the Organization for Economic Cooperation and Development (OECD, 2023).

In this scenario, cognitive skills take on a new dimension, transcending basic processes of perception and comprehension to involve higher-order functions such as critical thinking, metacognition, creativity, and problem-solving. These abilities take on particular relevance in educational environments mediated by emerging technologies, where automation and the growing availability of information are transforming the ways in which knowledge is processed, evaluated, and constructed especially with the incorporation of artificial intelligence systems and their relationship to the development of higher-order thinking skills (Song et al., 2025).

The emergence of hybrid human-machine cognition presents both opportunities for cognitive enhancement and risks of technological dependence, insofar as digital tools can simultaneously act as learning scaffolds or as substitutes for essential intellectual processes.

In this context, quantum computing is emerging as a technology with the potential to transform various fields of industry and knowledge production. Its development also raises the need to

prepare students to understand and navigate professional settings characterized by the convergence of advanced technologies. The Baker Dearing Educational Trust (2025) specifically highlights the importance of preparing students to interact with quantum computing and other emerging technologies, given the career opportunities that could arise from their gradual integration into various sectors.

Consequently, emerging technologies such as artificial intelligence, extended reality, blockchain, neurotechnologies, and quantum computing should not be viewed as ends in themselves, but rather as mediators of learning whose integration requires solid pedagogical foundations. Their incorporation into educational systems raises epistemological and ethical tensions that challenge the boundaries between cognitive optimization and the delegation of thought to automated systems (Costa Júnior et al., 2025).

From this perspective, educational training should not be limited to the development of technical skills but should also focus on students' ability to critically analyze, understand the implications of these technologies, and use them responsibly. In this regard, a central concern arises: What evidence does the scientific literature provide regarding the influence of the pedagogical integration of emerging technologies especially artificial intelligence on higher cognitive functions, critical thinking, and self-regulation of learning, and what ethical and pedagogical implications arise from their incorporation into educational settings?

Based on this issue, the following research question is formulated:

What evidence does the scientific literature provide regarding the influence of emerging technologies on higher-order cognitive functions, and what ethical and pedagogical implications arise from their incorporation into 21st-century educational settings?

In line with this question, the objective of this chapter is:

To analyze the scientific evidence regarding the influence of the pedagogical integration of emerging technologies particularly artificial intelligence on higher-order cognitive functions, critical thinking, and self-regulated learning, while considering the ethical and pedagogical implications associated with their incorporation into educational settings.

To achieve this objective, a qualitative documentary study was conducted, based on the review and analysis of scientific literature found in the Scopus and Web of Science bibliographic databases, as well as reports from international organizations. The search includes publications from the 2020–2026 period and focuses on studies related to the integration of emerging technologies particularly artificial intelligence and their relationship to higher cognitive functions, critical thinking, and self-regulated learning. Scientific articles that are relevant and directly linked to the subject of study are considered, with priority given to publications in Spanish and English. The selection of sources includes empirical studies and relevant theoretical developments on cognition, artificial intelligence, and education, while documents that do not have a substantive relationship with the central categories of the research are excluded.

The analysis is conducted through the identification, organization, and thematic comparison of the main findings in the literature. To this end, the information is organized into cognitive, technological, social, and ethical dimensions, with the aim of identifying trends, contributions, tensions, and challenges associated with the incorporation of emerging technologies into educational settings. This procedure allows for a comparison of the pedagogical opportunities and benefits highlighted in the literature with the limitations and potential risks associated with the intensive use of these technologies.

Within this framework, the chapter contributes to the scientific discussion by offering a comprehensive view of the relationship between cognition and emerging technologies, linking recent scientific evidence with a critical analysis of its implications for teaching and learning processes. It also highlights the need to strengthen students' abilities to interact consciously, critically, and ethically with advanced technological systems, thereby fostering the development of intellectual autonomy in educational contexts increasingly mediated by artificial intelligence.

Fundamentals of Cognition in Digital Environments and Dimensions of Cognitive Skills

The contemporary digital transformation has led to a profound reconfiguration of the cognitive processes associated with learning, especially in educational environments mediated by emerging technologies. In this context, cognition is no longer understood as an exclusively individual process but is instead conceived as a distributed and dynamic phenomenon in which biological, social, and technological factors interact. This approach, aligned with the principles of distributed cognition, suggests that digital tools not only support learning but also actively participate in shaping mental processes (Hutchins, 1995).

From this perspective, learning in the 21st century is built upon complex digital ecosystems characterized by hyperconnectivity, information overload, and the automation of cognitive tasks. In such environments, cognitive skills play a central role as adaptive mechanisms that enable individuals to interpret, filter, evaluate, and apply information efficiently. According to Lengua Cantero et al. (2020), the development of critical thinking and analytical skills in digital contexts is an indispensable requirement for coping with the growing abundance of unstructured information.

Within this framework, various international organizations and academic studies agree that cognitive skills must be approached from a multidimensional perspective that integrates emotional, social, and technological components. Salamanca Garay and Badilla Quintana (2020) emphasize that 21st-century competencies are structured within interdependent systems, where the interaction between personal and technological dimensions is key to the student's holistic development. This perspective goes beyond traditional approaches focused solely on the acquisition of knowledge, promoting educational models geared toward the development of adaptive and flexible skills.

As a result of this theoretical convergence, cognitive skills in the digital ecosystem can be understood as a set of interrelated capabilities that integrate personal, intellectual, social, and technological aspects. These capabilities act complementarily within the learning process, fostering students' holistic development and strengthening their ability to adapt, interact, and construct knowledge in environments characterized by digital transformation and constant change.

Table 1. *Dimensions of Cognitive Skills*

Dimension	Key Skills	Associated Cognitive Function
Personal/Emotional	Resilience, self-regulation, autonomy	Stress management and executive control in virtual environments (Costa Júnior et al., 2025, p. 8).

Higher-Order Cognitive Skills	Critical thinking, problem-solving	Data analysis and evaluation of information sources (Lengua Cantero et al., 2020, pp. 89–95).
Social/Interpersonal	Collaboration, communication, empathy	Teamwork facilitated by digital platforms (Aashiq et al., 2023, p. 12).
Digital/Technological	Information literacy, AI management	Use of tools and ethics in data usage (Infante Rivera et al., 2024, p. 6).
Dimension	Key Skills	Associated Cognitive Function.

Note: Compilation of key skills and their neurocognitive basis according to the current competency framework. References indicate the source of evidence for each executive function mentioned. AI: Artificial Intelligence. Author's own work.

As shown in Table 1, the personal/emotional dimension is linked to the capacity for self-regulation, resilience, and stress management in digital environments fundamental aspects for sustaining autonomous learning processes (Costa Júnior et al., 2025). For its part, the higher-order cognitive dimension encompasses skills such as critical thinking and the resolution of complex problems, which enable students to evaluate the quality of information and make informed decisions (Lengua Cantero et al., 2020).

Furthermore, the social/interpersonal dimension takes on special relevance in virtual contexts characterized by collaborative work and communication mediated by digital platforms. In accordance with Aashiq et al. (2023), digital social support serves as a mediating factor that enhances the effect of emerging technologies on cognitive development by promoting interaction, feedback, collaborative learning, and knowledge sharing among students. Finally, the digital/technological dimension focuses on information literacy and the ethical use of digital tools, including artificial intelligence, which involves understanding not only how they work but also their social and ethical implications (Infante Rivera et al., 2024).

The effective integration of these dimensions requires a structural transformation in educational systems, particularly in curriculum design and teaching methodologies. In this regard, flexibility emerges as a key principle, allowing learning to take place in multiple contexts through the use of mobile technologies, virtual platforms, and adaptive systems. Vargas Mendoza et al. (2013) note that mobile learning fosters the personalization of educational experiences, promoting greater autonomy and a sense of relevance among students.

However, the implementation of these educational models faces significant challenges related to teacher training. The incorporation of emerging technologies requires teachers to develop not only technical competencies but also pedagogical skills that enable them to guide the critical and reflective use of these tools. Cornejo Álvarez et al. (2024) emphasize that technological innovation in education only generates positive impacts when accompanied by adequate pedagogical mediation, capable of transforming technology into a meaningful resource rather than a distraction.

In this context, cognition in digital environments must also be analyzed from the perspective of cognitive load. Constant interaction with digital platforms, notifications, and multiple content streams can lead to cognitive overload, negatively affecting attention and information retention. However, when technologies are properly designed and implemented, they can help reduce extrinsic cognitive load and promote deep learning (Gkintoni et al., 2025). This duality reinforces the need to understand technology as a mediator that can either enhance or limit cognitive development depending on its pedagogical use.

Consequently, analyzing the cognitive dimensions within the digital ecosystem provides a solid conceptual foundation for understanding the interaction between technology and learning. Beyond the incorporation of digital tools, the challenge lies in designing educational experiences that promote the balanced development of higher-order cognitive skills, ensuring that technology acts as a facilitator of critical thinking, self-regulation, and intellectual autonomy rather than as a substitute for these processes.

Impact of Artificial Intelligence and Emerging Technologies on Cognitive Functions

The incorporation of emerging technologies into educational systems has significantly transformed the dynamics of cognitive processes, particularly as they relate to higher-order functions such as critical thinking, problem-solving, and decision-making. Among these technologies, artificial intelligence (AI) stands out as the most disruptive element, introducing models of interaction that reshape the way students process, organize, and apply knowledge (Cornejo Álvarez et al., 2024).

From a conceptual perspective, AI can be defined as a set of systems capable of simulating human abilities such as reasoning, learning, and decision-making (Infante Rivera et al., 2024). In the educational setting, its application takes the form of virtual assistants, intelligent tutoring systems, learning analytics, and adaptive platforms that tailor content based on student performance. This technological ecosystem creates favorable conditions for personalized learning, making it possible to accommodate individual paces and diverse cognitive styles.

However, the impact of AI on cognition is ambivalent. On the one hand, it helps optimize learning processes by reducing extrinsic cognitive load that is, the effort associated with the way information is presented (Wang and Zhang, 2026). By breaking down complex tasks into more manageable steps, AI enables students to focus their mental resources on constructing deeper conceptual frameworks a process known as productive cognitive effort. This process aligns with the principles of Cognitive Load Theory and reinforces technology's role as a learning scaffold. In this context, the model of cognitive co-regulation emerges, according to which the interaction between the student and the intelligent system must balance technological assistance with the student's own cognitive effort.

Several recent studies empirically support the positive impact of artificial intelligence on academic performance. Research based on learning analytics and neurophysiological data shows that adaptive systems can adjust task difficulty in real time, optimizing cognitive load and improving learning efficiency (Gkintoni et al., 2025). Furthermore, Keikhanejad et al. (2025) report significant increases in collaboration and complex problem-solving in AI-mediated educational environments.

As shown in Table 2, the use of AI can lead to quantifiable improvements in key areas such as collaboration, critical thinking, and productivity. These results suggest that artificial intelligence not only increases operational efficiency but can also enhance higher-order cognitive processes when properly integrated into instructional design.

However, these benefits are accompanied by significant cognitive risks. One of the most studied phenomena is the so-called "Google effect," which describes the tendency of individuals to remember the location of information rather than the content itself (Sparrow et al., 2011). This pattern of cognitive externalization can lead to a superficial understanding of knowledge, limiting its transfer to new contexts. Consequently, there is an emphasis on the need to integrate generative artificial intelligence as a cognitive scaffold that complements and strengthens learning processes, rather than replacing the student's intellectual effort. In this regard, the strategic use of cognitive delegation, accompanied by critical evaluation and higher-order reflection, promotes transformative learning and preserves students' cognitive autonomy (Wang and Zhang, 2026).

Table 2. *Areas of AI Impact on Performance*

Area of Impact	Estimated Improvement (%)	Mechanism of Action
Collaboration	15%–25%	Adaptive feedback during group tasks (Keikhanejad et al., 2025, pp. 188–190).
Problem Solving	20%	Content personalization and reduction of cognitive load (Keikhanejad et al., 2025, p. 189).
Critical Thinking	15%	Support for in-depth analysis of cases and data.
Productivity (Freshmen)	26.8%	Automation of routine tasks and code generation (Shen and Tamkin, 2026).

Note: The percentages are estimates based on evidence reported in the sources consulted and reflect AI's potential impact on academic performance and cognitive processes. Prepared by the author based on Keikhanejad et al. (2025) and Shen and Tamkin (2026).

Beyond artificial intelligence, other emerging technologies are helping to redefine forms of learning and cognitive development in the 21st century. Among these are augmented reality (AR), virtual reality (VR), blockchain, and learning analytics, all of which expand the possibilities for interaction, immersion, and understanding in educational settings. In particular, virtual reality has been shown to yield greater learning gains than traditional methods by offering immersive experiences that facilitate knowledge acquisition. However, its effectiveness depends on factors such as the sense of presence, motivation, interest, cognitive load, and the psychological readiness of students, with extrinsic cognitive load being one of the main factors limiting learning (Stefan et al., 2026).

Immersive technologies, such as AR and VR, allow complex phenomena to be represented through interactive three-dimensional environments, promoting spatial reasoning, conceptual understanding, and knowledge retention. Recent studies indicate that these tools can improve

learning by 20% to 30%, especially in scientific and technical disciplines (Castillo-Castro et al., 2021; Chen et al., 2025; Cromley et al., 2023). The ability to manipulate virtual models contributes to the active construction of knowledge, promoting meaningful, experience-based learning.

In particular, augmented reality has proven effective in developing scientific thinking. By superimposing digital information onto the physical environment, it facilitates the visualization of abstract structures and strengthens students' cognitive independence (Coronel Carrión et al., 2025). Complementarily, virtual reality allows students to experience simulated contexts that foster empathy, social understanding, and decision-making in complex scenarios (Chica Chica et al., 2023).

For their part, Thomsen, Hilfert-Rüppell, and Büssing (2026) demonstrated that immersive virtual reality promotes learning by increasing students' situational interest and sense of presence. They also demonstrated that interest is a positive predictor of learning gains, while the interaction between cognitive load and affective factors is crucial for understanding the learning process in immersive environments, providing evidence for refining the Cognitive-Affective Model of Immersive Learning.

As shown in Table 3, these technologies not only increase student motivation and engagement but also strengthen specific cognitive skills related to problem-solving and autonomous learning. However, their implementation must take into account factors such as cost, accessibility, and the potential effects of sensory overload.

Table 3. *Disruptive technological resources and specific cognitive abilities*

Technology	Specific Benefit	Enhanced Skill
Augmented Reality	Visualization of 3D models in the classroom	Logical reasoning and spatial geometry (Coronel Carrión et al., 2025, p. 69).
Virtual Reality	Immersion in Simulated Environments	Empathy and understanding of historical/social contexts (Chica Chica et al., 2023, p. 170). (Stefan et al., 2026). Cognitive engagement
Gamification	Reward and challenge mechanics	Intrinsic motivation and task persistence (Keikhanejad et al., 2025, pp. 186–187).

Note: The table illustrates disruptive technological resources and the strengthening of specific cognitive abilities. The selection highlights how immersion and play directly influence the structure of modern learning. Created by the author based on the findings of Chica Chica et al. (2023), Coronel Carrión et al. (2025), Keikhanejad et al. (2025), Stefan et al. (2026), and Thomsen et al. (2026).

In the context of emerging technologies, blockchain introduces a distinct dimension by impacting systems for certifying and validating learning. This technology improves the traceability, integrity, and authenticity of academic information by facilitating the issuance,

storage, and verification of educational credentials through distributed, tamper-resistant ledgers (Turkanović et al., 2021).

From a cognitive perspective, blockchain promotes student autonomy by enabling individuals to manage their own learning paths through verifiable credentials and digital portfolios. This model fosters lifelong learning and the development of academic identity, aligning with principles of self-regulation and metacognition. However, it also poses challenges related to data privacy, information governance, and equity in access to technology (Costa Júnior et al., 2025).

The convergence of technologies such as AI, extended reality, big data, cloud computing, and neurotechnologies is shaping a highly interconnected educational ecosystem. In this environment, cognitive processes are influenced by multiple simultaneous stimuli, creating new opportunities for learning but also risks associated with fragmented attention and information overload.

Learning analytics and big data, for example, make it possible to monitor cognitive performance in real time, identify learning patterns, and predict academic difficulties (Velvetech, 2025). These tools strengthen evidence-based pedagogical decision-making but also raise questions about digital surveillance and student privacy.

Likewise, gamification and educational metaverse environments increase motivation and engagement, promoting immersive and collaborative learning experiences. However, systematic reviews and meta-analyses in educational psychology warn that, when pedagogical guidance is insufficient, the use of extrinsic rewards (points, badges, leaderboards) can lead to dependence on external stimuli and foster superficial or short-term learning (Sailer & Homner, 2020; Kyewski & Krämer, 2018). Therefore, it is recommended to design gamified experiences that prioritize autonomy, competence, and alignment with curricular objectives, so that the playful elements reinforce rather than replace students' cognitive and metacognitive processes (Sailer & Homner, 2020).

Taken together, these emerging technologies converge toward a common goal: to enhance higher-order cognitive functions through personalization, interactivity, and experiential learning. However, the evidence reviewed suggests that their effectiveness does not depend exclusively on their technological sophistication, but rather on how they are integrated into pedagogical models that promote critical thinking, self-regulation, and intellectual autonomy.

Consequently, the educational challenge lies not merely in adopting emerging technologies, but in designing strategies that allow us to harness their potential without compromising the cognitive depth of learning. This balance between technological efficiency and human development is central to understanding the impact of innovation on 21st-century education.

Neuroeducation, Self-Regulation, and the Transformation of Learning in Digital Environments

The integration of emerging technologies into education has driven the consolidation of neuroeducation as an interdisciplinary field that brings together contributions from neuroscience, cognitive psychology, and educational computing. This approach is based on the principle that learning is not a linear process, but rather a complex dynamic in which cognitive,

emotional, and social variables interact, mediated by increasingly sophisticated technological environments (Borbor et al., 2025; Agualsaca Calle et al., 2025).

From this perspective, understanding how the brain functions in digital contexts is essential for designing effective educational experiences. Neural plasticity understood as the brain's capacity to reorganize itself based on experience becomes a central pillar for interpreting how technologies influence knowledge acquisition and the development of higher-order cognitive skills. In highly stimulating digital environments, this plasticity can enhance learning but can also lead to patterns of distraction and cognitive fragmentation if there is no adequate pedagogical guidance.

One of the fundamental pillars of neuroeducation is the relationship between attention, emotion, and learning. Scientific evidence shows that emotional states directly influence attention span, decision-making, and memory consolidation (Sánchez Palma et al., 2025). In this regard, digital environments must not only be functional from a technical perspective but also emotionally meaningful.

Emerging technologies, particularly those based on virtual reality, gamification, and artificial intelligence, have the potential to create immersive experiences that increase student motivation and engagement. Borbor et al. (2025) argue that interactive multimedia resources can strengthen intrinsic motivation when designed with pedagogical intent, fostering active participation and meaningful learning. However, this positive effect may be limited by the so-called "digital overstimulation effect," in which constant exposure to stimuli reduces the capacity for sustained concentration.

Consequently, the design of digital environments should be geared toward optimizing selective attention, avoiding cognitive overload, and promoting experiences that balance stimulation and reflection. This approach allows technology to act as a facilitator of deep learning rather than as a distractor that fragments cognitive processes.

In the context of technology-mediated education, metacognition and self-regulation emerge as fundamental competencies for ensuring autonomous and meaningful learning. Metacognition involves the ability to plan, monitor, and evaluate one's own cognitive processes, while self-regulation refers to the ability to strategically manage learning based on specific goals.

According to the University of the Incarnate Word (UIW, 2025), the development of reading and comprehension strategies enhances students' ability to analyze and synthesize complex texts in contexts characterized by an increasing availability of information. Within this framework, artificial intelligence can contribute to learning through individualized support systems that provide real-time feedback, personalized guidance, and adaptive recommendations based on students' progress.

For their part, Gkintoni et al. (2025) highlight that intelligent systems allow for real-time monitoring of cognitive performance, providing information that facilitates self-reflection and strategic decision-making. This type of feedback helps develop a deeper metacognitive awareness, as students can identify their strengths, weaknesses, and learning patterns.

However, this process also presents a significant tension. While AI can strengthen self-regulation, it can also foster dependence in decision-making, reducing students' ability to critically evaluate their own performance without technological assistance. This phenomenon reinforces the need to design pedagogical strategies that promote active cognitive engagement, avoiding excessive externalization of metacognitive processes.

The relationship between students and intelligent technologies has given rise to an emerging model of hybrid cognition, in which learning is constructed through the interaction between human capabilities and artificial systems. This approach, supported by distributed cognition theory, posits that cognitive processes are not limited to the individual but extend to the tools and environments they use (Hutchins, 1995).

Recent research delves deeper into this dynamic through the concept of dual cognitive pathways: cognitive monitoring and cognitive delegation. Wang and Zhang (2026) argue that transformative learning occurs when students combine both processes in a balanced manner. Cognitive monitoring involves critically analyzing information generated by AI, while cognitive delegation frees up mental resources to focus on more complex tasks.

This interaction can yield significant benefits when managed appropriately. Rather than replacing human thought, AI can act as a cognitive partner, expanding capacity for analysis, creativity, and problem-solving (Molenaar, 2022; Cukurova, 2024). However, when cognitive delegation is not accompanied by reflective processes, there is a risk of developing patterns of technological dependence that undermine intellectual autonomy.

Based on the elements analyzed, there is a need to establish a new educational approach grounded in neurocognitive literacy. This concept integrates knowledge about how the brain functions with the ability to critically engage with digital technologies, enabling students to consciously manage their own learning.

Neurocognitive literacy is grounded in the integration of various skills that enable students to function effectively in learning environments mediated by digital technologies. First, it involves understanding the cognitive processes involved in the acquisition and construction of knowledge such as attention, memory, executive functions, and metacognition which are essential elements for meaningful learning. It also requires developing a critical perspective on technology, enabling students to identify both its benefits and its potential risks, limitations, and algorithmic biases, thereby fostering a conscious and reflective use of these tools. Finally, it promotes self-regulation of learning through the strategic, responsible, and balanced use of digital resources, strengthening autonomy, decision-making, and the ability to adapt to constantly changing educational contexts.

This approach addresses the need to educate students capable of navigating complex digital environments without losing control over their own mental processes. According to Cukurova (2024), the future of education lies in the development of hybrid intelligence, where humans and artificial systems coexist in a complementary manner, enhancing learning without replacing fundamental cognitive abilities.

Taken together, neuroeducation provides a comprehensive understanding of how emerging technologies influence cognitive processes. The interaction between attention, emotion, metacognition, and self-regulation shapes an ecosystem in which learning depends as much on technological design as on pedagogical mediation.

Consequently, the development of cognitive skills in the digital age cannot be separated from an understanding of how the brain functions or from critical reflection on the use of technologies. The true potential of educational innovation lies in its ability to foster autonomy, critical thinking, and self-regulation, ensuring that students not only learn more but also learn better.

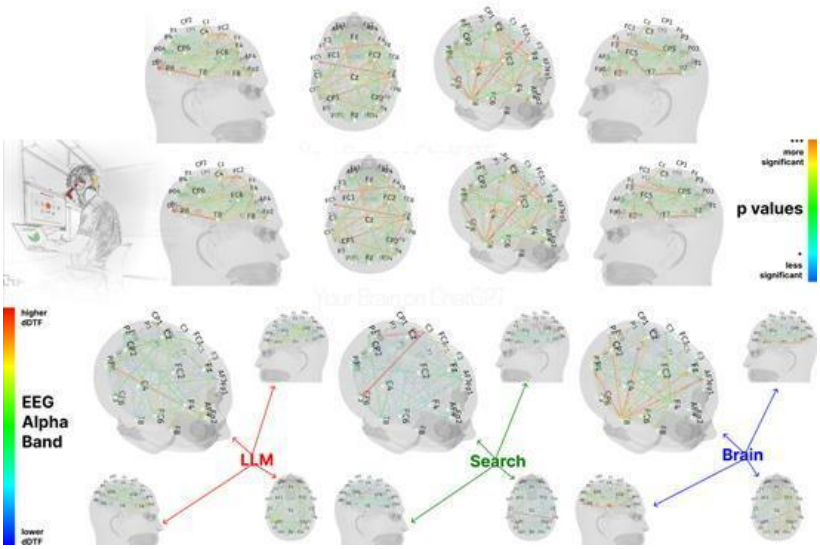
Neurocognitive, Ethical, and Neuro-Rights Risks in Digital Education

Despite the significant advances offered by emerging technologies in the field of education, their integration into teaching and learning processes is not without risks that must be analyzed from a critical perspective. In particular, the rapid adoption of artificial intelligence, neurotechnologies, and digital environments has raised growing concerns regarding their impact on higher cognitive functions, intellectual autonomy, and the integrity of human thought.

From a neurocognitive perspective, one of the relevant phenomena associated with the use of external tools to support mental processes is what is known as *"cognitive offloading,"* whereby certain cognitive processes can be partially supported or transferred to external resources. In this context, Kosmyna et al. (2025), in an experimental study conducted at the MIT Media Lab, analyzed the neural and behavioral consequences of using language models during an academic writing task. Using electroencephalographic (EEG) recordings, the authors identified differences in brain connectivity patterns between participants who used a language model or a search engine and those who performed the task without external tools. The group that used the language model exhibited the lowest levels of brain connectivity, while the group that performed the task without tools showed more distributed neural networks. These results suggest that the degree of cognitive engagement may vary depending on the level of support provided by external tools, although the findings should be interpreted with caution due to the preliminary nature of the study and the limitations of its generalizability.

As shown in Figure 1, the use of artificial intelligence tools may encourage the delegation of certain cognitive tasks, especially when these technologies replace part of the effort required to search for, process, and synthesize information. In this regard, the findings of Kosmyna et al. (2025) suggest that a lower level of active engagement during writing tasks may be associated with differences in brain connectivity patterns and in participants' subsequent performance. These results raise questions about the potential implications of an excessive reliance on AI tools for processes such as the construction, retrieval, and internalization of knowledge.

Figure 1. *Effects of intensive use of artificial intelligence on higher cognitive functions.*



Note. Reproduced from "Your brain on ChatGPT: Accumulation of cognitive debt when using an AI assistant for essay writing tasks," by Kosmyna et al. (2025).

https://doi.org/10.48550/arXiv.2506.08872. The figure summarizes aspects related to cognitive delegation and engagement in AI-mediated tasks. It highlights the possible relationships between the level of technological support, cognitive engagement, and brain connectivity patterns. Interpretation and drafting of this note: original work based on Kosmyna et al. (2025).

The impact of artificial intelligence is not limited to memory; it also directly affects the development of critical thinking. The ability to question, analyze, and evaluate information is compromised when students adopt a passive stance toward content generated by intelligent systems. According to Torralba Grisales (2025), the constant use of tools such as ChatGPT can interfere with the development of abstract reasoning, especially during formative stages when these skills are still in the process of consolidation.

This phenomenon is exacerbated in contexts where learning is geared toward obtaining quick answers rather than building knowledge. The immediate availability of solutions reduces the need to explore alternatives, formulate hypotheses, and think critically all of which are fundamental elements of the cognitive process. As a result, students may develop superficial learning characterized by poor retention and limited ability to apply what they have learned.

Table 4. *Identified Risks in the Use of AI*

Identified Risk	Manifestation in Students	Technological Causality
Reduced Connectivity	Reduced activation in the prefrontal cortex	Delegation of analytical tasks to algorithms (Kosmyna et al., 2025)
Memory Decline	Difficulty recalling one's own ideas	Skipping of deep memory processes (Kosmyna et al., 2025)
Technological Dependence	Anxiety caused by the lack of devices	Reinforcement of addictive stimuli on platforms (Royal National Academy of Medicine of Spain, 2024).
Algorithmic bias	Acceptance of biased information	Lack of transparency in AI training (Molina Mera et al., 2025, pp. 11468–11470).

Note: The table provides a summary of potential neurocognitive and ethical risks associated with the intensive use of digital technologies and artificial intelligence systems in educational contexts. The identified risks are linked to their potential manifestations in students and to technological factors that could contribute to their emergence. Prepared by the authors based on Kosmyna et al. (2025), Royal National Academy of Medicine of Spain (2024), and Molina Mera et al. (2025).

As shown in Table 4, the risks associated with the intensive use of emerging technologies include reduced neural connectivity, memory impairment, technological dependence, and exposure to algorithmic biases. These effects are not inherent to the technology itself but depend on the conditions under which the interaction between the user and the system occurs.

Another critical aspect in the discussion of emerging technologies is the presence of algorithmic biases, which can influence the quality of information and decision-making processes. Molina Mera et al. (2025) point out that artificial intelligence systems, when trained on large volumes of historical data, can reproduce patterns of discrimination or present biased information, thereby affecting the objectivity of knowledge.

In the educational context, this phenomenon takes on special relevance, as students tend to rely on technological systems as trustworthy sources of information. The lack of transparency in how algorithms function can limit users' ability to critically evaluate content, creating an epistemic dependence that compromises intellectual autonomy.

The convergence of artificial intelligence and neurotechnologies introduces an even deeper level of ethical complexity. Unlike other digital technologies, brain-computer interfaces (BCIs) and neurophysiological monitoring systems have the capacity to interact directly with the nervous system, raising fundamental questions about mental privacy and individual autonomy (Radu, 2025; Nieves-Méndez, 2025).

In response to these challenges, UNESCO (2025) has promoted the concept of "neuro-rights," understood as the set of safeguards designed to protect mental integrity, personal identity, and free will against technologies capable of accessing neural data. These rights include mental privacy, protection against cognitive manipulation, and control over one's own brain data.

The risk of violating these rights is particularly relevant in the educational setting, where the use of monitoring technologies can lead to cognitive surveillance practices. The collection of data related to attention, stress, or mental performance, if not managed ethically, can give rise to forms of control that transcend the traditional boundaries of academic assessment.

Prolonged exposure to digital environments can also generate patterns of technological dependence, characterized by a constant need to access devices and platforms to perform cognitive tasks. The Royal National Academy of Medicine of Spain (2024) warns that excessive use of digital technologies can alter attention and memory mechanisms, reducing the capacity for sustained concentration.

This phenomenon is closely linked to the design of digital platforms based on constant stimuli, immediate rewards, and continuous feedback. These mechanisms, inspired by attention economy models, can reinforce addictive behaviors that affect self-regulation and the ability to sustain prolonged cognitive effort.

In the educational setting, this situation poses a significant challenge, as technological dependence can interfere with the development of essential skills such as planning, organization, and critical thinking. Consequently, the use of emerging technologies must be accompanied by pedagogical strategies that foster autonomy and conscious control over learning.

The risks analyzed highlight the need to establish robust ethical frameworks to guide the integration of emerging technologies into education. Various studies agree that technology, in and of itself, does not guarantee improvements in educational processes; its impact depends on the conditions of use, pedagogical mediation, and the ethical principles that govern its implementation.

In this regard, recent literature emphasizes the importance of promoting critical digital literacy, which enables students not only to use technological tools but also to understand their cognitive, social, and ethical implications. This approach involves developing the ability to question

information, identify biases, protect personal data, and make informed decisions in complex digital environments.

Likewise, teacher training plays a fundamental role in this process. Educators must be prepared to critically evaluate the technologies they incorporate into their practices, ensuring that these contribute to students' holistic development rather than replacing their cognitive abilities.

Overall, the neurocognitive and ethical risks associated with emerging technologies should not be interpreted as a limitation on their use, but rather as a call for their responsible integration. The evidence analyzed demonstrates that technology can enhance learning when used strategically, but it can also have adverse effects when adopted without critical reflection.

Consequently, the contemporary educational challenge lies in balancing technological innovation with the preservation of students' intellectual autonomy, cognitive depth, and fundamental rights. The incorporation of ethical principles, the protection of neuro-rights, and the strengthening of neurocognitive literacy are key elements in ensuring the responsible and sustainable use of technologies in 21st-century education.

Integrated Analysis and Educational Outlook Toward the Year 2030

An analysis of the scientific literature and a systematization of the evidence allow us to affirm that the relationship between cognition and emerging technologies in contemporary education is a complex, dynamic, and deeply ambivalent phenomenon. Far from being neutral tools, technologies such as artificial intelligence, extended reality, blockchain, and neurotechnologies actively shape the transformation of learning processes, redefining the ways in which students access, process, and construct knowledge.

From an integrative perspective, the results show that the incorporation of these technologies promotes the optimization of cognitive processes, particularly in terms of reducing extrinsic cognitive load and personalizing learning. The automation of routine tasks and the immediate availability of information allow students to focus greater mental resources on higher-order activities such as analysis, synthesis, and creation, in accordance with the principles of Cognitive Load Theory (Gkintoni et al., 2025). In this regard, artificial intelligence can play a fundamental role as cognitive scaffolding, facilitating the construction of more complex mental schemas.

This approach is supported by recent research highlighting the transformative potential of generative artificial intelligence in educational settings. Janahi and Sakti (2025) argue that tools such as advanced language models not only increase academic efficiency but can also stimulate creativity and problem-solving, provided that users maintain a critical stance toward the information generated. Along these lines, Flores and Peña (2024) demonstrate that the integration of artificial intelligence into neurodidactic approaches promotes meaningful learning and strengthens techno-scientific competencies, showing that the impact of technology depends fundamentally on the pedagogical design that guides its use.

However, this transformative potential does not develop automatically. The evidence analyzed shows that the interaction between students and smart technologies creates a constant tension between two fundamental cognitive processes: cognitive monitoring and cognitive delegation. According to Wang and Zhang (2026), transformative learning occurs when both processes coexist in a balanced manner. While cognitive monitoring involves critically evaluating information, cognitive delegation frees up mental resources for more complex tasks. This dynamic suggests that the relationship between artificial intelligence and learning should not be

interpreted as a replacement for human thought, but rather as a form of human-machine cognitive collaboration.

However, this interaction can also lead to counterproductive effects when the learning process is not adequately regulated. Abbas et al. (2026) demonstrate that, while artificial intelligence tools increase academic efficiency, their excessive use can diminish the depth of learning, affecting conceptual integration and knowledge transfer. This phenomenon is explained by three main mechanisms: cognitive outsourcing, confidence calibration, and motivation regulation. In particular, excessive reliance on intelligent systems can reduce the capacity for critical inquiry, favoring forms of superficial learning.

The convergence of these findings suggests that the impact of emerging technologies on cognition does not depend solely on their level of sophistication, but rather on how students cognitively manage their interaction with them. This approach aligns with the distributed cognition perspective, according to which mental processes extend beyond the individual and involve technological tools and social environments (Hutchins, 1995). However, the effectiveness of this cognitive distribution is contingent upon the individual's ability to maintain reflective control over learning.

In this context, the concept of neurocognitive literacy emerges as a central element, understood as the ability to comprehend the mental processes involved in learning and to interact critically with digital technologies. This competency is positioned as a strategic pillar for 21st-century education, insofar as it enables students to identify when technology acts as a facilitator of learning and when, conversely, it may lead to cognitive dependence.

Neurocognitive literacy takes on special relevance in the educational landscape heading toward 2030, characterized by the convergence of technologies such as generative artificial intelligence, quantum computing, 5G networks, learning analytics, and neurotechnologies. This scenario shapes a highly interconnected educational ecosystem, in which teaching and learning processes will be increasingly mediated by intelligent systems capable of adapting in real time to students' needs.

However, this transformation poses significant ethical and social challenges.

As UNESCO (2023) warns, the integration of digital technologies is proceeding unevenly across different contexts, due, among other factors, to socioeconomic disparities and differences in access to technology. These gaps can exacerbate educational inequalities. Consequently, the quality of educational systems depends not only on the availability of technology but also on ensuring equitable access and appropriate conditions for its pedagogical integration.

In this regard, the future of education cannot be limited to the incorporation of advanced technologies but must be oriented toward the development of pedagogical models centered on human development. This implies prioritizing competencies such as critical thinking, creativity, self-regulation, empathy, and ethical judgment all of which cannot be replaced by automated systems. Artificial intelligence must be viewed as a means to enhance these capabilities and not as an end in itself (UNESCO, 2023b).

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A key element in this transformation is the need to redefine assessment models. In a context where students have constant access to systems capable of generating complex answers, traditional approaches based on memorization lose their relevance. Instead, we must move toward models of authentic assessment that focus on the ability to apply knowledge, solve real-world problems, engage in critical reasoning, and transfer learning to diverse contexts.

Likewise, teacher training is a key factor in the success of educational transformation. Teachers must not only master the technical use of digital tools but also develop pedagogical and ethical criteria that enable them to integrate these tools in a meaningful way. This includes the ability to design learning experiences that foster active student participation, critical reflection, and the responsible use of technology.

From an ethical perspective, the consolidation of neuro-rights presents an urgent challenge in the context of digital education. The growing capacity of technologies to access personal and neural data demands the implementation of regulatory frameworks that guarantee privacy, autonomy, and the integrity of human thought (UNESCO, 2025). Education must play a fundamental role in shaping citizens capable of understanding and defending these rights in an increasingly intrusive technological environment.

Finally, the evidence analyzed supports the argument that the true educational challenge of the 21st century is not to teach how to use technologies, but to teach how to think with them, about them, and beyond them. Technological innovation will only generate positive impacts if it is directed toward strengthening human capacities and building more equitable, critical, and sustainable societies.

Consequently, the educational landscape toward 2030 is taking shape as a hybrid ecosystem in which the interaction between human intelligence and artificial intelligence redefines learning processes. However, the key to this transformation lies in the ability of educational systems to balance technological efficiency with cognitive depth, ensuring that digital progress effectively contributes to students' holistic development rather than replacing their intellectual capacities.

Conclusions

The analysis presented throughout this chapter supports the assertion that the integration of emerging technologies into 21st-century education is shaping a scenario of profound transformation in the cognitive, pedagogical, and ethical processes that underpin learning. Far from being merely supportive tools, technologies such as artificial intelligence, extended reality, blockchain, and neurotechnologies are emerging as active agents in the reconfiguration of human cognition, introducing new dynamics of interaction between students, knowledge, and digital systems.

In this context, one of the main findings of the research lies in identifying the dual nature of these technologies. On the one hand, their incorporation into educational settings promotes the optimization of cognitive processes by reducing extrinsic cognitive load, personalizing learning, and providing immediate access to information all of which enhance higher-order skills such as problem-solving, critical thinking, and creativity. On the other hand, their intensive and unmediated use can lead to adverse effects associated with cognitive offloading, superficial learning, and the weakening of essential cognitive functions such as memory and self-regulation.

In this regard, evidence shows that technology's impact on learning does not depend on its level of sophistication, but rather on the pedagogical and cognitive conditions in which it is integrated.

The interaction between students and technological systems should be understood as a process of co-construction of knowledge, in which artificial intelligence acts as a scaffold that amplifies human capabilities without replacing them. The absence of this balance can lead to patterns of technological dependence that limit intellectual autonomy and reduce the depth of thought.

Another key contribution of the study relates to the incorporation of the neuroeducational approach as an interpretive framework for understanding the interaction between technology and cognition. The analyzed evidence demonstrates that the processes of attention, emotion, memory, and metacognition play a decisive role in the quality of learning in digital environments. Consequently, the design of technology-mediated educational experiences must consider not only technical aspects but also neurocognitive principles that ensure active student participation and meaningful knowledge construction.

Based on these elements, it is established that neurocognitive literacy constitutes a fundamental competency for contemporary education. This concept goes beyond traditional digital literacy by integrating an understanding of cognitive functioning with the ability to critically analyze technologies and consciously regulate their use. A neurocognitively literate student not only uses digital tools but is also able to identify when they enhance learning and when they may lead to dependence or excessive automation.

Furthermore, the study leads to the conclusion that the incorporation of emerging technologies raises highly significant ethical challenges, particularly regarding privacy, equity, and the protection of personal and neural data. The emergence of the concept of "neuro-rights" highlights the need to establish regulatory frameworks that guarantee students' mental integrity, free will, and autonomy in the face of systems capable of influencing cognitive processes. In this regard, education must take a leading role in shaping critical citizens who are capable of understanding and defending their rights in a highly complex digital environment.

Similarly, it is recognized that the future of education will not depend exclusively on access to technology, but rather on the ability of educational systems to integrate these tools into pedagogical models centered on human development. The persistence of the digital divide poses a significant risk to educational equity; therefore, it is essential to implement policies that guarantee inclusive access, teacher training, and the development of critical digital competencies at all educational levels.

Looking ahead to 2030, it is concluded that education must evolve toward a hybrid model in which human intelligence and artificial intelligence coexist in a complementary manner. This model entails a transformation in teaching methods, assessment systems, and the competencies required of both students and teachers. In particular, educational assessment must shift toward authentic processes that evaluate analytical skills, critical reasoning, creativity, and the application of knowledge in real-world contexts, moving beyond traditional approaches based on memorization.

Finally, this chapter concludes that the contemporary educational challenge does not lie in adopting emerging technologies, but in ensuring that their use contributes to strengthening students' cognitive, ethical, and human capacities. Twenty-first-century education must prepare individuals capable of thinking critically about technology, reflecting on it, and transcending it when necessary. Only from this perspective will it be possible to ensure that technological innovation acts as a true multiplier of knowledge and not as a substitute for human thought.

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Rural Productive Development as a Driver of Local Socioeconomic Development: A Participatory Assessment in La Unión Parish, Ecuador

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Introduction

Sustainable development has become a global imperative, and its implementation at the local level is crucial for building a more equitable future. Within this framework, productive development emerges as a central strategy for boosting the economy, social cohesion, and environmental sustainability of regions, particularly in rural areas, where poverty, inequality, and the degradation of natural resources persist. Latin America starkly illustrates this tension: despite progress in various macroeconomic indicators, the region continues to grapple with high levels of poverty, which are particularly acute in rural areas, where families depend heavily on agricultural activities that are often unsustainable.

Ecuador is no exception to this reality. Its rural communities face multidimensional challenges ranging from the prevalence of smallholdings to the migration of the young population that limit their progress and, over time, erode the very social fabric that sustains agricultural production. Given this landscape, it is worth asking: What elements must a productive development model incorporate to effectively and sustainably promote the socioeconomic development of an Ecuadorian rural community? Answering this question requires, first, understanding the theoretical relationship between local socioeconomic development and rural productive development; second, rigorously assessing the actual situation of a specific territory; and, third, discussing and interpreting these findings in light of the specialized literature, so that they serve as reliable input for the design of interventions.

This chapter proposes precisely this approach. It takes as its case study the parish of La Unión, located in the canton of Jipijapa, province of Manabí a region known for coffee cultivation and agriculture that encapsulates many of the structural tensions in rural Ecuador. The overall objective is to analyze rural productive development as an essential component of local socioeconomic development, based on a participatory assessment that combines a structured survey of agricultural households with validation by a panel of experts directly linked to the area.

To this end, the chapter is organized into three sections. The first section provides a theoretical foundation for the relationship between local socioeconomic development and rural productive development, defining the problem situation that gave rise to the study and the central argument advanced throughout the text. The second section describes the methodological process used sample design, instrument validation, and analysis techniques and presents the results of the assessment, including the parish's socio-organizational, economic-productive, environmental, and infrastructure characteristics, as well as an analysis of strengths, weaknesses, opportunities, and threats. The third chapter interprets these results in light of the criteria that, according to the local stakeholders themselves, a relevant model of productive development should meet, and contrasts them with findings from related research conducted in other Latin

American rural contexts. The chapter concludes with a final reflection on the contributions of this assessment to the understanding of rural productive development as a lever for local development.

Local Socioeconomic Development and Rural Productive Development: Theoretical Foundations and Current Challenges

Local socioeconomic development (LSD) and rural productive development (RPD) are not isolated concepts, but rather interdependent components of the same strategy for territorial progress. LSD can be understood as a process of structural change, confined to a defined geographical area, that improves the living conditions of its inhabitants through the empowerment of local actors, the mobilization of endogenous resources, and the building of self-management capacities. This approach goes beyond the mere accumulation of wealth: it integrates social, cultural, environmental, and institutional dimensions under the premise that solutions to local problems must emerge, to a large extent, from the territory itself.

The FPR, for its part, brings together policies, programs, and initiatives aimed at revitalizing and diversifying rural economic activities in order to generate employment, increase income, and improve the competitiveness of local products and services. It is not limited to agricultural and livestock activities: it includes agribusiness, rural tourism, handicrafts, environmental services, and small non-agricultural enterprises. Its essential foundation lies in identifying market niches and differentiating products through quality, origin, or sustainability labels. Empirical evidence gathered in the Ecuadorian highlands confirms this logic: community-based initiatives succeeded in diversifying the rural economy and improving producers' standard of living when they had access to land and other productive assets a determining factor for their effective participation in markets (North and Cameron, 2000).

The interconnection between these two concepts is crucial: productive development acts as a driving force, while local socioeconomic development provides the holistic framework that ensures the benefits of that driving force are widely distributed and contribute to the overall well-being of the rural population. Recent studies on rural communities in Ecuador confirm that this community-led approach translates into concrete improvements in social organization and local leadership, provided there is adequate institutional coordination (Valdiviezo Cacay and Sánchez Flores, 2023).

It is important, however, to situate this conceptual framework within its historical and structural context. The agricultural economy has been mired in a prolonged crisis since the Great Depression of the 1920s, from which it has not yet fully emerged, due to characteristics inherent in agricultural production relations: the physical limitations of the fundamental means of production land the existence of landowners who restrict the free movement of capital, and the system of land rents associated with such ownership. These factors result in a low level of development of the productive forces, limit the introduction of science and technology, and lead to low yields. Added to this is the extractive role played by certain agribusinesses in exploiting agricultural resources, which creates a structur y inability to achieve progress from endogenous conditions that are already depressed. This environment ultimately encourages rural residents to abandon their communities a migratory phenomenon that constitutes one of the main threats identified in the assessment presented below.

Under this logic, rural areas have historically been sidelined in traditional development models, viewed merely as suppliers of raw materials or cheap labor, without addressing their multidimensional potential. The contemporary understanding of rural development goes beyond agricultural production: it incorporates non-agricultural activities, the strengthening of the social fabric, environmental protection, and improvements in technology and infrastructure. Digitalization, for example, offers new opportunities for rural producers, allowing them to access information, training, and markets in an unprecedented way, while the promotion of the circular economy, community-based rural tourism, and the valorization of local products with a territorial identity are examples of how productive diversification can generate new sources of income and employment, while strengthening the culture and heritage of communities. In this regard, local socioeconomic development emerges as a holistic strategy that seeks to empower communities to become active agents in shaping their own destiny, by identifying their strengths, addressing their weaknesses, capitalizing on opportunities, and confronting the threats in their environment.

Within this framework, the availability of adequate financing constitutes another critical foundation for rural productive development. The macroeconomic assessment of Ecuador's economic growth confirms that the private banking sector has historically maintained a short-term lending orientation, directed primarily toward consumption and commerce rather than productive activities with higher value added, which limits the availability of long-term financing essential for productive investment, including in rural areas (Paredes, 2018). Overcoming this constraint requires diversifying sources of financing public, private, and international cooperation funds and promoting community banking models that expand the productive capacity of these territories.

Similarly, associativity constitutes a cross-cutting pillar of the FPR. In Ecuadorian rural contexts similar to the one analyzed in this chapter, agricultural associativity has been identified as a key strategy for rural development (Sanabria and Salgado, 2023), as it enables small-scale producers to overcome limitations in access to financing and strengthen their continued presence in the productive sector, in line with the objectives of comprehensive rural development and food sovereignty outlined in Ecuadorian public policy (Quiñonez Alvarado and Estrada Carrera, 2018).

In the specialized literature, the discussion on public policy design for rural productive development revolves around two approaches that do not always complement each other in practice. The first, a productivist approach, prioritizes increasing agricultural supply and integration into value chains through credit incentives and targeted technology transfer, based on the assumption that growth in production almost automatically translates into improvements in rural income. The second, with a territorial focus, argues that such an increase in production generates local socioeconomic development only when it is linked to institutional strengthening, participatory governance, and the building of endogenous capacities within the territory, so that the surpluses generated remain and are reinvested locally rather than flowing out to intermediaries or urban centers. The experience of Tungurahua Province illustrates the practical implications of choosing this second path: there, the design of a public policy for territorial and sustainable productive development was based on a comprehensive assessment that combined an analysis of the productive structure, the perceptions of local stakeholders, and the identification of sectoral growth potential, rather than merely allocating financial incentives based on a decontextualized sectoral approach (Flores-Tapia et al., 2023). This same logic guides the assessment presented in this chapter: rather than directly proposing a policy package replicated from other contexts, we have chosen to first build a territorially grounded empirical foundation that of the La Unión Parish which will allow us, in a later stage of the doctoral research

of which this chapter is a part, to design public policy recommendations tailored to the socio-organizational, economic-productive, and environmental particularities documented here, rather than generic assumptions about what "should" work in any rural area.

The problem situation that gives rise to this chapter can therefore be formulated in the following terms: despite the widespread recognition of rural productive development as a driver of local socioeconomic development, a large portion of Ecuador's rural communities remains trapped in a cycle of small-scale farming, low levels of technification, dependence on commercial intermediaries, and youth migration, with no intervention models sufficiently tailored to their specific territorial characteristics. This gives rise to the research question that guides this chapter: What socio-organizational, economic-productive, environmental, and infrastructural characteristics must a productive development model identify and consider in order to be relevant and viable in a specific Ecuadorian rural community?

The idea advanced throughout this chapter is that a sustainable productive development model is effective only if it focuses on promoting comprehensive socioeconomic development and not merely economic growth by reducing inequalities in the distribution of resources and access to basic services, while also fostering environmental stewardship. This premise requires, as an essential preliminary step, a rigorous and participatory assessment of the territory, whose methodological design and main results are presented in the following section.

Participatory Assessment in the La Unión Parish: Methodological Process and Results

To address the research question posed, a participatory assessment was designed and implemented in the La Unión parish, Jipijapa canton, Manabí province, Ecuador. The assessment combined a structured agricultural survey with expert validation using the Delphi method, following the guidelines of the Guide for the Strategic Assessment of a Rural Community in Ecuador for the Purpose of Promoting Productivity (García et al., 2022).

The survey was administered using stratified sampling to 530 rural households, producers, and community leaders, comprising a total of 1,236 individuals. This sample represents approximately 64% of the parish's active agricultural population, estimated at 1,941 people based on projections from the National Institute of Statistics and Censuses. The sampling frame was constructed based on the list of agricultural households in the 23 communities and districts that make up the parish; stratification was performed by community, with additional grouping by farm size range and primary productive activity agricultural, livestock, or mixed within each geographic stratum, and sample allocation was proportional to the number of households registered in each community.

The survey instrument consisted of 18 items distributed across five dimensions: socio-organizational, economic-productive, environmental-territorial, infrastructure and connectivity, and agriculture-specific. It combined closed-ended multiple-choice questions, scored using ordinal categorical scales, with open-ended questions to gather qualitative information. Since the instrument groups categorical questions organized into five distinct thematic dimensions rather than a unidimensional attitudinal scale a Cronbach's alpha coefficient was not calculated, as this would not be methodologically appropriate for this type of instrument; instead, validity was based on a content review conducted by a panel of nine experts with direct ties to the region, comprising representatives from academia, parish public administration, the area's

corporate coffee industry, and grassroots producers with experience ranging from 5 to 65 years. Validation was conducted using the Delphi method in two rounds, after which a Kendall's coefficient of concordance of 0.85 was achieved, indicating a strong degree of agreement among the evaluators.

The survey results allow the parish to be characterized across five dimensions. In the sociodemographic dimension, the sample showed a nearly equal gender distribution among the adults surveyed 50.8% men and 48.0% women while the presence of children was marginal (1.2%), a pattern that reflects the survey's design targeted at heads of households and the economically active population rather than the parish's actual demographic structure.

In the socio-organizational dimension, 45% of respondents are 35 years of age or older, and within that group, 52% are women, underscoring the central role of women in family farming. Sixty percent of households reported youth migration for employment reasons, a phenomenon that erodes the territory's social capital; however, 70% view traditional agricultural knowledge positively, suggesting untapped potential for community-based tourism. Participation in producer organizations was moderate (40%), with a medium-to-high level of trust in mingas the traditional Andean practice of collective work (65%). This level of associativity is consistent with recent research that identifies it as a key rural development strategy in similar contexts (Sanabria and Salgado, 2023), and with socio-productive characterizations of coffee-growing systems in neighboring cantons of Manabí, which document comparable patterns of low income and dependence on traditional crops (Fuentes Figueroa et al., 2024; Vera-Velásquez et al., 2024).

In terms of economic and productive activities, the main production systems are agriculture (80%, predominantly corn and coffee) and livestock farming (50%); these categories are not mutually exclusive, as a significant portion of producers combine both activities on mixed-use farms ranging from one to five hectares (55% of cases). Inputs come mainly from the region itself (70%), and the main problems reported were pests (60%) and low yields (50%). Only 30% of producers add value locally through some degree of processing, packaging, or transformation prior to sale and marketing is carried out primarily through intermediaries (65%). The available labor force is low due to migration (45%), and the popular and solidarity-based economy operates informally in 40% of cases, highlighting a concrete opportunity for cooperative strengthening.

In terms of the environment and productive resources, soil quality presents significant challenges: 34.5% of the land is classified as fertile with erosion that is, it retains adequate nutrients but shows visible signs of topsoil loss while 25.6% is classified as very fertile and 24.3% as moderately fertile, representing significant potential for crop diversification using conservation practices. Some 15.6% of the evaluated area consists of poor soils, a minority that nonetheless includes critical zones with severe nutrient limitations.

Regarding infrastructure and connectivity, 50% of respondents rated the condition of roads as fair, 40% reported having basic infrastructure for processing, and 55% indicated low digital connectivity. The improvement priorities identified by the community focus on roads (70%) and irrigation (60%). Finally, in the specific agricultural sector, the main crops are corn (60%), cassava (50%), plantains (45%), and coffee (40%), with average plot sizes ranging from 0.5 to 1 hectare; production is low or moderate for example, between 10 and 30 quintales of corn in 50% of cases and is primarily intended for subsistence consumption (60%). In livestock farming, cattle predominate (40%, between 1 and 5 head) as do poultry (50%, between 21 and 50 birds), with a portion destined for local sale (40%).

Based on these results, a SWOT analysis matrix was developed. Among the strengths identified were productive diversity which combines coffee with staple crops strong social capital and agricultural tradition, and high female participation in production. The most significant weaknesses were the predominance of smallholdings (less than five hectares), poor road infrastructure, low levels of mechanization and value addition, and soil erosion exacerbated by droughts. Notable opportunities include strengthening producer associations, developing local processing of coffee, cassava, and plantains, promoting agroecology and rural tourism, and expanding the popular and solidarity-based economy. Finally, the main threats identified were youth migration, the impact of climate change, and dependence on commercial intermediaries.

The intersection of these four components led to the derivation of eight strategic lines, prioritized according to their expected impact and feasibility of implementation in the short term. The highest-priority strategies combine the strengthening of associations and access to mechanisms of the popular and solidarity economy to address small-scale farming and low levels of mechanization, along with market diversification and resilient crops to reduce dependence on intermediaries. A second priority level includes the development of cooperative processing plants, the promotion of local processing and rural tourism, and the strengthening of cooperative networks to negotiate fair prices. Strategies with a slower timeframe, such as community-based tourism linked to the popular and solidarity economy and agroecological water harvesting practices, round out a third tier, while the creation of technical jobs linked to productive diversity aimed at curbing youth migration constitutes a long-term structural priority, since its implementation depends on training and investment processes that extend beyond the immediate timeframe of intervention.

Converging Findings and Criteria for a Relevant Productive Development Model

The results described make more sense when contrasted with the assessments of the local stakeholders themselves and with the specialized literature on rural productive development in similar contexts. The supplementary consultation conducted with a panel of experts and grassroots producers composed of representatives from the corporate coffee industry, local academia, parish-level public administration, and producers with up to 65 years of experience allowed us to identify five criteria that, taken together, any productive development model applicable to the parish should meet: economic sustainability and market viability, strengthening of associations and local governance, climate adaptation and environmental sustainability, social inclusion and generational succession, and efficiency in technology transfer and technical assistance.

It is significant that these five criteria formulated independently by four distinct groups of stakeholders with different interests and perspectives converge on similar concerns. From the perspective of corporate coffee management, emphasis is placed on the need to break the intermediaries' oligopoly through industrial coffee processing and commercial scale. From the perspectives of academia and local development, priority is given to promoting short supply chains and strengthening local markets under the model of a popular and solidarity-based economy. Public administration underscores that, without adequate road infrastructure and digital connectivity, the production model lacks a foundation. And traditional peasant wisdom insists that any development strategy must first address the cost of inputs and household food

security, given that more than half of households' agricultural and livestock production is currently destined for self-consumption.

This convergence of perspectives aligns directly with international evidence on rural development. The experience of community-based initiatives in the Ecuadorian highlands confirms that access to land and other productive assets is crucial for small-scale producers to diversify their economies and improve their standard of living through effective participation in markets (North and Cameron, 2000), a finding reflected in the persistence of smallholdings as the main structural weakness identified in La Unión. Similarly, research on poor communities in the Ecuadorian highlands shows that, even when sharing similar conditions of location and market access, these communities are heterogeneous in terms of educational attainment, coverage of basic services, and access to productive resources such as land factors that decisively shape the poverty alleviation strategies their inhabitants are able to undertake (Hentschel and Waters, 2002); this heterogeneity is evident in the assessment of La Unión itself, where highly fertile soils coexist alongside areas with severe nutrient limitations, and households with high participation in associations coexist with others having weak organizational ties.

Regarding the financial dimension, both the field assessment and the macroeconomic literature agree that access to productive credit is a structural bottleneck. The Ecuadorian banking system has maintained a short-term lending orientation, focused on consumption and commerce rather than on productive activities with higher value added (Paredes, 2018), which partly explains why only 30% of producers in La Unión manage to add value locally to their production, leaving the majority trapped in selling to intermediaries. Overcoming this limitation requires as recent studies on public policies for territorial productive development in the province of Tungurahua point out that any intervention be based on a comprehensive assessment that combines an analysis of the productive structure, the perceptions of local stakeholders, and the identification of sectoral growth potential (Flores-Tapia et al., 2023) exactly the methodological approach applied in the assessment of La Unión.

In this context, associativity emerges as the central axis linking the various strategies derived from the analysis of strengths, weaknesses, opportunities, and threats. The level of participation in producer associations observed in La Unión (40%), along with a medium-to-high level of trust in mingas (65%), is consistent with research that identifies agricultural collaboration as a key strategy for rural development in similar contexts (Sanabria & Salgado, 2023) and with studies on the transition of Ecuadorian entrepreneurs toward business consolidation, which point to small-scale producer associations as a means to overcome limitations in access to financing and strengthen their continued presence in the productive sector, in line with the comprehensive rural development objectives outlined in national public policy (Quiñonez Alvarado and Estrada Carrera, 2018).

It is particularly worth examining how association and short supply chains already identified by the expert panel as a medium-term strategic priority could simultaneously address two of the most persistent structural weaknesses identified in the assessment: small-scale farming and youth migration. The logic is as follows: when small producers in La Unión whose farms average between one and five hectares market their products individually through intermediaries as is currently the case in 65% of instances the margin they retain is insufficient to finance the modernization or value addition that would allow these same small-scale farms to generate income comparable to that of a larger-scale operation. Cooperation functions here as a mechanism for achieving scale through substitution: by consolidating the output of numerous smallholdings into a jointly marketable volume for example, through cooperative coffee

processing plants or local markets operating under the popular and solidarity-based economy model, both of which have already been prioritized in the matrix of strategic lines producers gain access to negotiating terms and marketing channels previously reserved for larger operations, without the need to concentrate land ownership. This role of associativity as a substitute for individual scale is consistent with evidence on community-based rural development in the Ecuadorian highlands, where collective access to productive assets rather than their individual accumulation proved decisive for economic diversification and improvements in producers' living standards (North and Cameron, 2000).

Regarding youth migration, the link is more indirect but no less relevant: short marketing channels and cooperative processing generate during the stages of collection, processing, and sale technical and administrative jobs that do not exist in individual primary production precisely the type of employment whose absence the assessment itself identifies as the main barrier to retaining the young population in the area. To the extent that these jobs are located in the parish itself or in nearby cantonal capitals, cooperative organization not only improves the income of current producers but also broadens the range of employment opportunities available to their sons and daughters without requiring them to abandon family farming or migrate to cities. This mechanism aligns with findings regarding the transition of Ecuadorian rural entrepreneurs toward more established business models, in which the formation of associations among small producers emerges as the primary means of overcoming limitations in access to financing and ensuring their continued presence and that of future generations in the productive sector (Quiñonez Alvarado and Estrada Carrera, 2018). However, it is important not to overestimate the scope of this mechanism: the socio-productive characterization of the coffee-growing systems in the La Unión parish itself shows that low incomes and dependence on traditional crops are structural phenomena that no associative strategy alone can reverse in the short term (Fuentes Figueroa et al., 2024), so its effect on youth migration should be understood as a necessary, but not sufficient, condition within a broader model of productive development.

However, the assessment also reveals tensions that the literature does not always capture with the same clarity as fieldwork. The generational gap 60% of households reported youth migration coexists with a high valuation of traditional agricultural know- (70%), suggesting that the problem is not the absence of peasant knowledge, but rather the lack of attractive economic opportunities that would allow young people to capitalize on that knowledge without having to leave the area. Similarly, soil erosion and vulnerability to climate change identified as threats by a large majority of respondents contrast with the fact that nearly half the population currently does not implement any adaptation practices. This points to a gap between perceived risk and effective response capacity that any productive development model must bridge through technology transfer relevant to the local context, rather than through generic solutions imported from other contexts.

Finally, it is important to acknowledge, with methodological honesty, the limitations of this assessment, as useful lessons for rural productive development in general can also be drawn from them. The predominant reliance on the structured survey, as opposed to fully participatory techniques such as workshops or community mapping, suggests that any intervention model must complement quantitative instruments with spaces for dialogue that give the community a deeper voice beyond simply answering a questionnaire. Furthermore, as this is a case study limited to a single parish, the findings cannot be automatically generalized to other rural areas in Manabí or the country; therefore, its main value lies in offering a replicable method and not necessarily extrapolatable results for assessing rural communities with similar characteristics.

Conclusions

The participatory assessment conducted in the La Unión Parish confirms that rural productive development is, in fact, an indispensable component of local socioeconomic development, but it also shows that its effectiveness depends on the ability of any intervention model to simultaneously rather than sequentially address a set of dimensions that are rarely tackled in an integrated manner. The convergence between the results of the survey administered to 530 households, the SWOT analysis, and the assessment by the four groups of experts consulted business, academic, public sector, and small farmers demonstrates that the community studied possesses significant endogenous potential, including remarkable productive diversity, social capital consolidated around collective practices such as the minga, and a body of traditional agricultural knowledge that remains relevant despite migratory pressures.

At the same time, the assessment reveals structural weaknesses that extend beyond the local level and that the specialized literature recognizes as characteristic of Latin American agriculture in general: the predominance of smallholdings, low levels of mechanization and value addition, deficient road and connectivity infrastructure, and the migration of the young population to urban centers in search of employment. These findings support the argument put forward throughout this chapter: a model of sustainable productive development is effective only if it goes beyond economic growth as an end in itself and instead focuses on promoting comprehensive socioeconomic development one capable of reducing inequalities in access to resources, basic services, and financing without neglecting care for the natural environment on which, ultimately, the very continuity of agricultural activity.

The evidence gathered also suggests that no single component neither an injection of credit alone, nor infrastructure improvements alone, nor technical training alone is sufficient to reverse the trends of stagnation and depopulation currently affecting communities such as La Unión. It is the integration of economic viability, organizational strengthening, climate adaptation, social inclusion, and relevant technological exchange that can sustain, over time, a genuinely local rural development process. In this regard, strengthening community organizations emerges as the link that connects all the others: it is through robust producer organizations with democratic governance that it becomes feasible to negotiate financing on better terms, access economies of scale for local processing, channel technical assistance in a sustained manner over time, and generate technical jobs capable of retaining the young population in the region.

This chapter, which focuses on the diagnostic phase of a broader doctoral research project, does not aim to exhaust the discussion on rural productive development in Ecuador, but rather to offer context-specific empirical evidence that helps bridge the gap often highlighted in the literature between the conceptual frameworks of local development and the concrete realities of the territories where these frameworks must be implemented. Future stages of this line of research will involve the design, implementation, and evaluation of a productive development model that translates the criteria identified here into concrete interventions, as well as the exploration of its validity in other rural parishes with similar characteristics, so that the lessons learned in La Unión can contribute to a broader and more useful for public policy understanding of productive development as a driver of rural socioeconomic development in Ecuador.

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The Prudence Principle as an Operational Category in Microcredit Evaluation: Formalization, Decision Matrix, and Evidence from a Savings Bank in Guayaquil

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Introduction

Credit risk management in microfinance differs by nature from that in commercial banking: the subject of the assessment the ability and willingness to pay of a borrower operating in the informal sector is not recorded in any formal source. Microentrepreneurs, the self-employed, and low-income wage earners lack audited financial statements, an extensive credit history, and, frequently, registrable collateral. The lending institution must construct this information at a unit cost compatible with transactions whose average amount, in the case analyzed, is less than six hundred dollars.

The compilation of this information is not neutral: the person collecting the data typically interprets it and proposes the decision, and their performance is measured by the volume of loans originated. The conflict of interest is structural and cannot be resolved through ethical exhortations or ex post controls, but rather through rules that limit optimistic bias in data production. This is the realm of the principle of prudence: accounting has recognized it for over a century as a convention of asymmetric recognition, but the financial literature has not developed it as an operational criterion for credit decisions.

There is a critical gap at the grassroots level of Ecuador's popular and solidarity-based financial system: nearly 1,600 savings banks, banks, and community credit unions manage popular savings under a self-regulatory regime, without external prudential supervision (Proaño-Altamirano et al., 2024). In these institutions, internal credit assessment is the only effective safeguard for members' savings. Research has focused on cooperatives in higher-tier segments, and the dominant solutions (machine learning, alternative data, comprehensive risk systems) require infrastructure and personnel that an organization with seven employees simply does not possess.

This tension gives rise to the chapter's central question: How can the principle of prudence be formalized as an operational category of microcredit assessment, so as to standardize and make the decision auditable in small-scale institutions, without requiring technological capabilities they lack or restricting access to credit for the population that is their raison d'être? Three questions arise from this: what components should the prudential criterion include; how can it be translated into a weighted, replicable, and low-cost tool; and what information does it provide that conventional indicators do not reveal?

The objective is, therefore, to formalize the principle of prudence as an operational category for microcredit assessment and translate it into a decision matrix comprising four weighted components, verifying its operational feasibility and informational value at a savings bank in Guayaquil (2022–2025). The case study (Caja de Ahorros Bolivariana) is analytically rich because it exhibits the best portfolio indicators in its environment (a delinquency rate of 0.25% compared

to a sector average of nearly 8.5%), which subjects the hypothesis to its most rigorous test: if the instrument adds information where delinquency is nearly zero, its usefulness is established a fortiori.

The contribution operates on three levels. On the theoretical level, it offers an operational definition that shifts prudence from accounting recognition to credit decision-making, complete with components, directional asymmetry, and verification criteria. On the methodological level, it provides a tool (the prudence matrix) that standardizes and documents the evaluation without replacing the committee's judgment, featuring transparent calibration unlike black-box models. On the practical level, it demonstrates that an institution with minimal delinquency can simultaneously exhibit a concentration by repayment source of 6,311 points and liquidity at the action threshold, and that the prudential criterion transforms these into measured risks with a response plan. Formalized prudence is not an obstacle to financial inclusion, but rather a condition for its sustainability.

Credit Rationing as an Information Problem, Not a Price Problem

The starting point is the demonstration by Stiglitz and Weiss (1981) that, in the presence of asymmetric information, the credit market does not achieve equilibrium through price. Raising the interest rate to compensate for risk deteriorates the portfolio's composition: lower-risk borrowers leave the market (adverse selection), and those who remain undertake riskier projects (moral hazard). The result is an equilibrium with rationing: unmet solvent demand that no increase in price can satisfy.

The problem is not solved, therefore, by making credit cheaper, but by generating the information needed to distinguish between applicants. Ecuador illustrates the challenge: informal employment accounts for over 51% of the workforce (National Institute of Statistics and Censuses, 2026), and only a minority of adults have access to formal credit a gap that the World Bank (2025) documents as persistent across the region. The gap worsens depending on gender, geographic location, and exposure to aggregate shocks (Lorain et al., 2025): each of these dimensions represents missing information that credit technology must fill.

Alternative Credit Technologies and Their Scope

In the absence of formal financial information, microfinance institutions have developed alternative technologies that replace accounting data with relational data. Joint guarantees, prior savings, staggered repayment amounts, on-site visits, and shared ties serve as mechanisms for revealing private information. Gehrig et al. (2021) model repayment as a cooperation problem: reciprocity and group reputation sustain compliance rates that no individual contract could induce. In Ecuador, Salinas Vásquez et al. (2024) document the explanatory power of social capital over credit risk even after controlling for financial variables, and López-Sánchez et al. (2022) identify, in Ecuadorian savings groups, determinants of default that are social rather than financial in nature.

Their limitation is well known: they mitigate the borrower's idiosyncratic risk but do not protect against correlated risk. Wei et al. (2024) show that the relational density that reduces risk in normal times amplifies it when a shock affects the common node. This is what happens when a portfolio depends on a single employer, market, or production chain. Ahmed et al. (2026) document a similar phenomenon in the climate context: aggregate risk is not diversified by

increasing the number of operations of the same type. Ariefianto et al. (2024) find, in Indonesian rural banks, that diversification and capital buffers are robust determinants of risk management.

Statistical Automation and the Problem of Proportionality

The dominant contemporary response is data analytics. Reviews by Zhang and Yu (2024) and Montevechi et al. (2024) agree that ensemble algorithms outperform parametric models when sufficient historical data is available. Chai et al. (2025) apply this approach to rural microfinance using an explainable hybrid model, and Jiang et al. (2026) demonstrate, in the context of Chinese microenterprises, that alternative data improve predictive power compared to traditional information. Airlangga et al. (2026) even explore digital psychometric assessment in platform-based microcredit.

These developments share three conditions that the grassroots level does not meet: a sufficient history of defaults to train and validate the model; infrastructure for data collection and governance; and the technical capacity to interpret and audit results. The principle of regulatory proportionality, formulated by the Basel Committee on Banking Supervision (2022), legitimizes this: technical requirements must be proportional to size, complexity, and risk profile, and a simplified framework can be just as rigorous if its rules are explicit and verifiable. The issue is not choosing between algorithms and intuition, but rather building a third way: structured, transparent, and low-cost rules.

Over-indebtedness, Deviation from Mission, and the Cost of Imprudence

Imprudence in loan origination has costs that extend beyond the balance sheet. Iskander et al. (2025) document in Cambodia the deterioration in household health associated with over-indebtedness: the problem also harms the borrower, not just posing a risk to the lender. Mission drift is the other side of the phenomenon: Serrano-Cinca et al. (2023) show that shifting toward higher-income clients improves returns for certain stakeholders (the tension between sustainability and inclusion does not resolve itself spontaneously), and Xu et al. (2024) show that the trade-off between efficiency and social reach depends on the macroeconomic and institutional context. Moreno-Menéndez et al. (2025) add that sustainability also depends on human talent, bringing the issue back to the organizational level.

The accounting and regulatory framework rounds out the picture. The expected loss approach, adopted internationally following the financial crisis (Financial Stability Institute, 2023), replaces the recognition of an incurred loss with its prospective estimate. Behn and Couaillier (2026) warn that institutions with weak capital tend to set aside fewer provisions: the accounting rule alone does not guarantee prudence. In Ecuador, Resolution 557-2019-F establishes the management of cooperative credit risk (Monetary and Financial Policy and Regulation Board, 2019), Resolution 675-2021-F regulates savings banks (Monetary and Financial Policy and Regulation Board, 2021), and Resolution JPRF-F-2024-0123 establishes the classification of risk assets and provisions (Monetary and Financial Policy and Regulation Board, 2024). The Organic Monetary and Financial Code (National Assembly of Ecuador, 2024) ultimately governs the entire system. The framework exists; what is missing is the instrument to make it operational at the decision-making level.

Problem Statement, Question, and Hypothesis

The problem situation is articulated in three interconnected propositions. First: small-scale microfinance institutions conduct evaluations using criteria inherited from traditional banking criteria that are neither standardized nor documented because the technical alternatives exceed their capabilities. Second: this evaluation produces information biased toward optimism, because those who generate it have commercial incentives and are not subject to rules that limit their discretion. Third: self-assessment indicators (delinquency, coverage, profitability) are reactive and aggregate: they may show excellent performance while unmeasured, correlated exposures accumulate.

The hypothesis holds that formalizing the principle of prudence as an operational criterion comprising four verifiable components (ability to pay, character and environment, realistic valuation of collateral, and reasonableness of the intended use) weighted and integrated into a decision matrix with rules of directional asymmetry and conservative scenarios increases the informational quality of the assessment, makes visible risks that delinquency does not reveal, and is applicable using resources from the base segment, without reducing coverage of the served population.

The Principle of Prudence: From Accounting Convention to Operational Decision-Making Criterion

Operational Definition

The principle of prudence is defined in this chapter as the guiding criterion according to which every credit decision in a microfinance institution must be based on the simultaneous and documented verification of four components (the quantitative analysis of repayment capacity, the qualitative analysis of the borrower's character and environment, the realistic valuation of collateral, and the reasonableness of the investment plan or intended use of the loan), developed under rules of directional asymmetry and conservative scenarios, and evaluated within predefined exposure limits, so that financial inclusion is achieved without transferring unmeasured risks to members' savings.

Three features distinguish this definition from the accounting convention of the same name. First, its purpose is not to recognize an event that has already occurred, but to provide information for a future decision: it operates ex ante, at the time of data collection, not ex post, at the time of recording. Second, it incorporates non-monetary components (character, relational context, stated purpose) that the accounting convention does not address. Third, it is not a vague moral value but rather rules verifiable by a third party: an auditor can verify whether they were applied, based on what evidence, and with what result; this verifiability makes it an operational category.

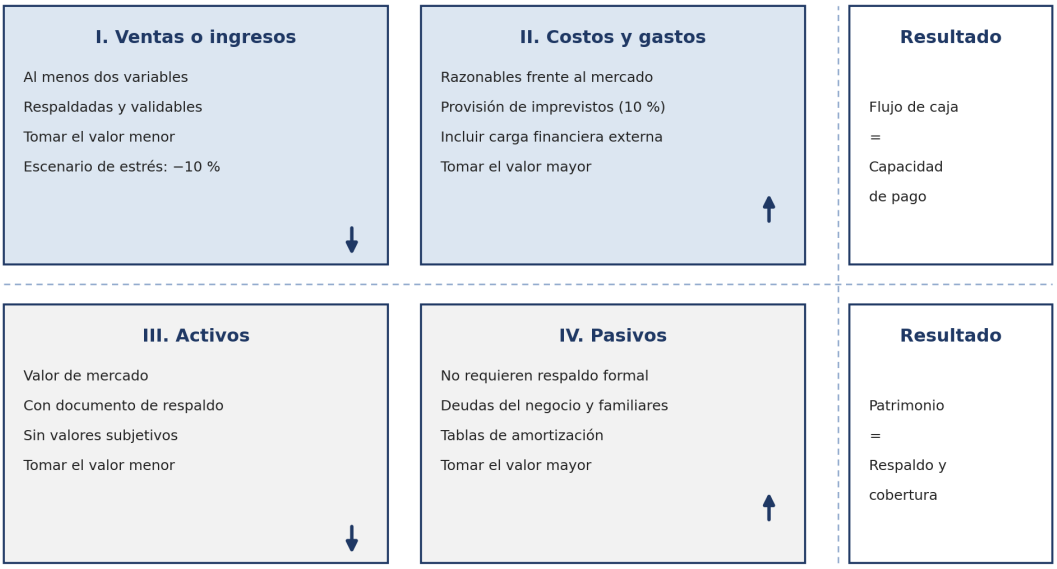
The Rule of Directional Asymmetry

The technical core is the rule of directional asymmetry, which governs the four financial statements that the officer must construct when the applicant does not have them: when faced with two or more admissible estimates, the one least favorable to approval is adopted. For revenue, it requires at least two independent variables (installed capacity, hours worked, number

of employees, inventory turnover, sales receipts) and retains the lower figure. For costs and expenses, it compares the reported figures with market ranges, retains the higher figure, and adds a 10 percent provision on variable expenses. For assets, it values them at market price with supporting documentation and retains the lower figure; for liabilities, it records all known obligations including informal ones without supporting documentation and retains the higher figure.

This asymmetry replicates, in the estimation, the asymmetric payment structure of the credit contract. The creditor shares in the debtor's losses but not in its extraordinary gains; its payment function is concave, such that an unbiased estimate of payment capacity produces a biased estimate of the transaction's value to the creditor. The rule corrects this bias in an explicit and auditable manner. Figure 1 illustrates the quadrant matrix and its rules.

Figure 1. Quadrant matrix of the prudence principle and directional asymmetry rules



Note. Prepared by the author based on the methodological framework of Fogacho and Mitic (2017). The arrows indicate the direction of the prudential correction: downward, retain the lower estimate; upward, retain the higher estimate.

The first pair of quadrants converges on cash flow and payment capacity; the second, on net worth and collateral capacity. Both results are inherently correlated, and that correlation serves as a consistency check: if the applicant reports a monthly surplus of $1,000 and their net worth has not grown accordingly, one of the estimates is inconsistent and must be revised. In the family economic unit which predominates among Ecuadorian microenterprises verification requires consolidating the business's net worth with that of the family, due to the ongoing cash flows between the two.

The Four Components and Their Formal Expression

Payment capacity is the surplus of the consolidated cash flow of the business and the household, calculated using the rules of Quadrants I and II under a scenario of a 10 percent decline in

income. If Y denotes verified income, G denotes costs and expenses including a contingency reserve, D denotes the bureau's external financial burden, and c denotes the requested installment, eligibility requires that (C + D) divided by 0.9Y minus G not exceed the institution's prudential ceiling. Incorporating D and the stress factor represents a substantive difference from current practice, which evaluates the installment solely against declared gross income. The projected cash flow follows the budgetary logic of the economic unit's financial planning, adapted to the scale and informality of the segment (Cevallos Bravo et al., 2024).

The qualitative component assesses character and environment using observable indicators: internal savings and payment history, length of the relationship, job stability, community references, and participation in the financial education program. The predictive power of these variables in contexts of scarce information is well documented (Gehrig et al., 2021; Salinas Vásquez et al., 2024), and their structured recording allows them to be statistically calibrated over time. The assessment of financial literacy is supported by evidence on repayment intention, where financial literacy, attitudes, and self-efficacy explain a significant portion of the observed behavior (Ab Hamid et al., 2025). The collateral component assesses the effective liquid coverage (amount requested versus savings plus pledged certificates), the formalization of the pledge, and, where applicable, the realizability of the collateral. The purpose component assesses the reasonableness of the purpose, its consistency with income, and its contribution to the applicant's net worth or well-being; it serves as a control for moral hazard and a safeguard for the social purpose.

Table 1. *Components, Variables, and Verification Rules for the Principle of Prudence*

Component (weight)	Variables Assessed	Prudential verification rule
Quantitative analysis (40 points)	Verified income and stability of the income source; consolidated costs and expenses of the business and the household; external financial obligations as reported by the credit bureau; available surplus and debt-to-income ratio.	At least two independent variables for estimating income, supported by evidence and verifiable; retain the lower value. Costs and expenses compared to market rates; retain the higher value and set aside 10% for contingencies. Conservative scenario of a 10% decline in income.
Qualitative Analysis (25 points)	Internal savings and payment history; length of relationship with the institution; job stability or stability of economic activity; references from the immediate community; participation in the financial education program.	Documentary record of each indicator in the file; verification of at least one external reference; absence of assessments not supported by verifiable evidence.
Collateral (20 points)	Liquid coverage (ratio between the requested amount and savings plus contribution certificates); formalization of the pledge; collateral and its effective realizability.	Valuation at market price with supporting documentation; exclusion of subjective assessments; use of the lower estimate.

		Pledge formalized prior to disbursement.
Investment or Use Plan (15 points)	Reasonableness of the stated purpose; consistency with the applicant's income level and the requested amount; contribution to the applicant's assets or well-being; ability to verify the intended use after disbursement.	Express statement of the intended use in the application; verification of consistency with the estimated cash flow; provision for post-disbursement verification of transactions involving the reference amount.
Total (100 points)	Decision Categories: A (80–100), standard approval; B (65–79), approval with conditions; C (50–64), enhanced review by the full committee with a reasoned decision; D (less than 50), denial with guidance provided to the member.	Score, evidence, and decision recorded in a single format, filed in the case file, and available for internal and external audit.

Note: Prepared by the author.

The Prudence Matrix as a Decision-Making Tool

The prudence matrix translates the four components into a 100-point scale: 40 for the quantitative component, 25 for the qualitative component, 20 for collateral, and 15 for the purpose of the loan. The weighting prioritizes repayment capacity without basing the decision solely on it, and assigns a 60 percent weight to non-financial components: relational information is just as informative as financial information. The weightings are an explicit working hypothesis, recalibrable based on accumulated evidence; this transparency is an advantage over black-box models.

The score classifies the application into four categories. An "A" (80 to 100 points) results in standard approval. A "B" (65 to 79) results in conditional approval: a reduction in the loan amount or term, additional collateral, or prior completion of the financial education module. A "C" (50 to 64) requires review by the full committee, with a reasoned decision. A D (less than 50) results in denial, accompanied by guidance for the member on how to access credit in the future: the denial becomes an educational opportunity and preserves the relationship.

It is important to clarify what the matrix is not. It is not a predictive model: it does not estimate probabilities of default nor does it replace expected loss, which operates at a later stage. Nor does it replace the committee's judgment: it structures it, documents it, and makes it auditable a hybrid approach that the literature recognizes as best practice when data do not allow for automation. Its function is epistemic: to ensure that every decision is based on the same information, prepared according to the same rules, and recorded in the same format, so that it is comparable, reviewable by a third party, and accumulatable for future calibration.

Integration with Prospective Risk Measurement

The principle applies to origination; expected loss applies to the established portfolio. Three rules govern this framework. The first sets prudential floors for expected loss parameters: when

the observed default frequency is not statistically significant (young or heavily mitigated portfolios), the probability of default does not fall below 1 percent annually, nor does the severity fall below 25 percent. These floors prevent the absence of historical losses from resulting in a zero provision an error that Behn and Couaillier (2026) show is associated with weak capital positions. The second rule requires measuring concentration by repayment source with the same frequency as delinquency, using the share of each source and the Herfindahl-Hirschman Index. The third requires semiannual stress tests that simulate, at a minimum, the termination of the relationship with the primary repayment source, the loss of ties with a fraction of borrowers, and a liquidity shock due to accelerated deposit withdrawals, all assessed against equity and available funds. This requirement is justified by the feedback loop between credit risk and liquidity risk in Ecuadorian microfinance institutions (Uquillas and Simbaña, 2022): in small institutions, portfolio deterioration and cash flow stress are not independent of one another.

Financial Performance and Balance Sheet Structure

The institution increased its total assets by a factor of 3.6 over three fiscal years, with annual growth rates of 125.2% in 2023, 20.6% in 2024, and 31.5% in 2025. Table 2 presents the evolution of the statement of financial position.

Table 2. *Evolution of the financial position of the institution under study, 2022–2025 (U.S. dollars)*

Item	2022	2023	2024	2025
Total Assets	405,206	912,492	1,100,592	1,447,009
Gross loan portfolio	366,365	860,471	1,048,558	1,404,679
(–) Allowance for uncollectible loans	2,631	9,988	17,486	23,792
Net loan portfolio	363,734	850,483	1,031,072	1,380,887
Cash on hand and in banks	18,863	52,093	61,762	59,718
Total Liabilities	343,364	673,217	699,536	874,221
Deposits received from members	120,765	345,100	395,098	587,001
Accounts payable to related parties	214,906	320,141	284,571	260,141
Total equity	61,842	239,275	401,056	572,788
Equity / Total Assets (%)	15.3	26.2	36.4	39.6
Net portfolio / total assets (%)	89.8	93.2	93.7	95.4
Net income for the year	(15,687)	10,601	28,119	34,797

Note: Prepared internally based on tax returns filed with the Internal Revenue Service (2022–2025), audited financial statements, and the internal balance sheet as of December 31, 2022. The 2024 figures were restated due to the adoption of the long-term employee benefit policy.

Three structural features emerge from the data series. First, the concentration of assets in the portfolio: 89.8% at the end of the first fiscal year and 95.4% in 2025 a proportion typical of a single-product entity that maximizes asset productivity at the expense of its liquidity buffers. Second, sustained strengthening of equity: equity rose from 15.3% to 39.6% of total assets, driven by contribution certificates, the undistributable reserve fund (2% of each loan), and the capitalization of earnings a level four times the standards required of supervised institutions. Third, the composition of funding: member deposits coexist with liabilities to the two institutions in the joint venture totaling $260,000 a stable structure as long as the joint venture remains in place, but one that depends on two related counterparties.

The Paradox of Portfolio Quality

The most notable finding of the financial analysis is the quality of the loan portfolio. Table 3 compares the institution's indicators with the system's benchmarks.

Table 3. *Portfolio quality and performance indicators compared to the cooperative system (percentages, unless otherwise indicated)*

Indicator	2023	2024	2025	System Benchmark
Delinquency (past-due portfolio / gross portfolio)	1.16*	0.07	0.25	8.5 (Segment 1, January 2026)
Non-performing portfolio / total portfolio	n.a.	0.07	0.18	5.0 (permissible threshold)
Provision coverage (times)	n.a.	24.3	6.7	1.5 (recommended minimum)
Provisions / gross portfolio	1.16	1.67	1.69	n/a
Recovery through payroll deductions	n.a.	n.a.	99.66	n/a
Return on assets	1.16	2.61	2.43	0.26 (2024 cooperative average)
Return on Equity	4.43	7.14	6.14	2.05 (2024 cooperative average)
Equity / Total Assets	26.2	36.6	39.6	10.0 (benchmark minimum)

Note: Prepared internally based on the audited financial statements and management report; system benchmarks according to the statistical portal of the Superintendency of Popular and Solidarity Economy (2026). The asterisk indicates that in 2023, delinquency is estimated based on the provision set aside, given the absence of an audited breakdown of past-due loans. The abbreviation n.a. means "not available" and n.c. means "no comparable reference."

The past-due portfolio at the end of 2025 totaled $3,554 out of a gross portfolio of $1,404,679, that is, a delinquency rate of 0.25%, compared to an average of 8.5% in the top tier of the cooperative sector and levels close to 12% in cooperative microcredit at the most critical point in the cycle (Panchi Arias, 2025). Provisions cover 6.7 times the past-due portfolio, and profitability is several times higher than sector averages. A superficial reading would conclude that the institution has no credit risk problem.

The analysis leads to the opposite conclusion. The low delinquency rate does not stem from a risk management system which does not exist at the institution but rather from a single mitigating factor: the payroll deduction from employers in the common employment relationship, which in 2025 processed $1,211,873 with a 99.66% success rate. Payroll loans are a double-edged sword: the payroll deduction reduces idiosyncratic risk but does not eliminate the systemic risk associated with the employment relationship, and it can lead to both over-indebtedness on the part of the borrower and overconfidence on the part of the lender (Schuh and Coronel, 2026). Here, the entire portfolio is exposed to two employers from the same

educational group, with five-year agreements expiring in 2027: a textbook example of concentration risk, invisible to delinquency indicators.

Measurement of Expected Loss

Applying the prudential floor rule to the portfolio as of the end of 2025 yields the results shown in Table 4.

Table 4. *Expected loss of the portfolio as of December 31, 2025 (U.S. dollars)*

Portfolio segment	Exposure (EI)	PI (%)	PDI (%)	Expected loss
Current portfolio (consumer and educational)	1,401,125	1.0	55	7,706
Past-due portfolio	3,554	100.0	55	1,955
Total gross portfolio	1,404,679			9,661
Expected loss / gross portfolio (%)				0.69
Provision set aside				23,792
Provision set aside / expected loss (times)				2.5

Note: Prepared internally based on the audited financial statements, using the prudential parameters defined in the methodology section. PD: probability of default; EE: exposure to default; LGD: loss given default.

The analysis yields three key findings. First: the 12-month expected loss, measured using prudential thresholds, amounts to $9,661 (0.69% of the gross portfolio), consistent with annual provisioning expenses ($6,306 in 2025), which confirms the reasonableness of the parameters. Second: the accumulated provision covers 2.5 times the expected loss an implicit countercyclical buffer that the principle of prudence makes explicit and turns into a stated policy. Third, and most importantly: for the first time, the institution has a forward-looking metric to price risk, budget provisions, and evaluate every change in origination policy, thereby closing the gap in reactive management of the diagnostic process.

Concentration and Stress Testing

The distribution of loan collections in 2025 between the two agreements ($758,290 from the primary employer, 75.6%, and $245,046 from the secondary employer, 24.4%) provides an approximation of the portfolio's composition by source of repayment. The Herfindahl-Hirschman Index stands at 6,311 points out of 10,000 three times the high-concentration threshold (2,500) and exposure to the primary employer exceeds the 70 percent limit proposed in the risk appetite statement. The dominant risk on the balance sheet is quantified for the first time. Table 5 summarizes the three stress tests.

Table 5. *Stress Tests for Concentration and Liquidity Risk (U.S. dollars)*

Scenario	Estimated Credit Loss	Impact on Equity (%)	Liquidity Gap	Reading
E1. Non-renewal of the agreement with the second employer	37,702	6.6		Absorbable through earnings and provisions

E2. Termination of 15% of the debtors under the main agreement	15,929	2.8		Absorbable with established provisions
E3. Combined (E1 + E2 + withdrawal of 30% of short-term deposits)	53,631	9.4	96,510	Solvency preserved; requires activation of the liquidity contingency plan

Note: Prepared by the author. Reference equity: $572,788; available funds: $59,718. Scenario E1 assumes a stressed default probability of 20% and a severity of 55% on the portfolio associated with the affected agreement; Scenario E2 assumes a 20% probability and a 50% severity on 15% of the portfolio under the main " " agreement, with partial recovery through asset liquidation; Scenario E3 combines both with the withdrawal of 30% of short-term deposits.

Solvency holds up even under the severe combined scenario: the aggregate loss amounts to 9.4% of equity, and the equity-to-assets ratio would remain above 35%. The vulnerable area is not solvency but liquidity: in the combined scenario, the shortfall of $96,510 far exceeds available funds, and a contingency plan must be prepared in advance: temporary suspension of lending (the average monthly inflow of $100,989 covers it within a month), contingent financing with counterparties, and staggering of term maturities. The result illustrates the value of prudential analysis: it transforms an invisible vulnerability into a measured, bounded risk with a defined response, in line with the interdependence between credit and liquidity risk documented in Ecuadorian microfinance institutions (Uquillas and Simbaña, 2022).

The Prudential Matrix Applied to a Typical Case

The matrix was applied to the institution's typical profile: a teacher under the main agreement, with four years of service, a verified monthly salary of $1,100, savings and certificates totaling $1,700, who requests a $5,000 consumer loan over thirty-six months (approximate monthly payment of $166 at 12 percent per annum), with a verified external financial obligation of $120 per month on record with the credit bureau and a stated purpose of home improvement. Table 6 summarizes the resulting credit rating.

Table 6. *Application of the prudential matrix to a typical case*

Component (weight)	Variables Evaluated	Score
Quantitative (40)	Ratio of total debt service (installment of 166 plus external debt burden of 120) to verified income of 1,100: 26.0%; under a 10% income contraction scenario: 28.9%, below the prudential ceiling of 50%. Four years of employment history. Positive household cash flow margin under stress.	34
Qualitative (25)	Internal record of regular savings with no delinquencies; three years as a customer of the institution; favorable employment references; financial education module pending completion.	21
Collateral (20)	Liquid collateral covering 34% of the requested amount (1,700 out of 5,000), which meets the three-to-one rule; formalized pledge of savings and contribution certificates.	18

Investment Plan (15)	Declared purpose of home improvement, verifiable and consistent with income level; contributes to family equity.	12
Total (100)		85
Decision	Category A: Standard approval, contingent upon completion of the financial education module prior to disbursement.	

Note: Prepared by the author.

This exercise highlights the dual effect of the instrument. It documents and standardizes a decision that currently relies on the committee's unstructured judgment, providing auditable evidence and incorporating information that current practice omits: the bureau's external burden and the scenario of a decline in income. The difference is quantitative: under current practice, the $166 installment is compared to an income of 1,100 (15.1%, automatic approval); under the prudential criterion, the ratio rises to 28.9%, which is permissible given the 50% ceiling, but with only half the apparent margin. This differential harbors the over-indebtedness that payroll deductions conceal, with the effects on household well-being documented in the literature (Iskander et al., 2025).

First Measurement of the Key Risk Indicators Dashboard

Table 7 presents the initial measurement of the key risk indicators dashboard, with data as of the end of 2025 and as of April 2026.

Table 7. *Key Risk Indicators Dashboard: First Measurement*

Indicator	Measured Value	Normal Threshold	Alert Threshold	Status
Delinquency (past due / gross)	0.25%	≤ 1.5%	1.5–3.0%	Normal
Provision coverage	6.7 times	≥ 1.5	1.0–1.5	Normal
Expected loss / portfolio	0.69%	≤ 1.0%	1.0–2.0%	Normal
Exposure to the primary employer	75.6%	≤ 70%	70–80%	Warning
Herfindahl-Hirschman Index by employer	6,311	≤ 2,500	2,500–5,000	Equity
Available funds / short-term deposits	11.5% (Dec. 2025); 5.5% (Apr. 2026)	≥ 10%	5–10%	Alert / Action
Annual growth in loans	27.8%	≤ 25%	25–40%	Warning
Applications with a credit bureau inquiry	0%	100%	< 100%	Equity

Note: Prepared internally using data from the institution. The thresholds correspond to the proposed risk appetite statement.

The first metric on the dashboard summarizes the central argument: an institution with a delinquency rate of 0.25% has two indicators at the "action" level (concentration by employer and failure to consult the credit bureau) and three at the "alert" level (exposure to the main employer, the ratio of available funds to short-term deposits, and the growth rate of loans).

What the Prudential Criterion Adds and Why

The results highlight the informational value of the prudential criterion. It does not consist of better predicting individual default, but rather involves three shifts: from reactive to prospective indicators (delinquency reports what has already happened; expected loss, what may happen); from idiosyncratic risk to correlated risk (the interdependence among positions, which concentration and stress tests make explicit); and from self-reported data to data verified according to established rules (the credit bureau and the conservative scenario add information that was not previously available to decision-makers).

This last point is not merely a matter of procedural rigor. Imprudence in microfinance is rarely a blatantly wrong decision; rather, it is the right decision made based on incomplete information that no one was obligated to complete. No amount of model sophistication could resolve what a rule-based approach does resolve.

The Tension Between Prudence and Inclusion

The most serious objection to this approach is that prudence operates as a form of exclusion: every rule that tightens the assessment criteria reduces the number of eligible applicants, and an institution whose mission is to promote inclusion would contradict itself by adopting such a rule. The objection has a theoretical basis it is the rationing mechanism described by Stiglitz and Weiss (1981) and empirical support in the evidence that tightening underwriting criteria shifts the portfolio toward higher-income segments (Serrano-Cinca et al., 2023; Xu et al., 2024).

The response is that the objection confuses the level of stringency with the quality of the information. Verifying external financial obligations does not raise the eligibility threshold: it reveals the applicant's actual standing relative to a threshold that has not changed. The applicant remains eligible; what changes is that the institution is aware of this, and this awareness promotes inclusion: it allows the institution to structure the transaction (adjust the amount or term, require the financial education module) rather than approving it blindly.

Nevertheless, a real residual tension remains. The asymmetry applied to the income of an informal microentrepreneur will, in some cases, result in the denial of loans that would otherwise have been repaid. This cost inherent in any rule under uncertainty must be weighed against its counterpart: loans approved without such a rule that erode members' savings and undermine household financial health. Evidence on over-indebtedness (Iskander et al., 2025) suggests that these two errors are not symmetrical and that the prudential bias is justified.

Why a Matrix and Not an Algorithm

The choice of weighted rules over a statistical model requires justification, as the literature documents the predictive superiority of machine learning methods (Zhang and Yu, 2024; Montevechi et al., 2024; Chai et al., 2025). Three reasons support this choice. The first is data availability: a classifier trained on a portfolio with twenty-five delinquencies per ten thousand transactions would learn to predict non-default with extremely high accuracy but no discriminative power.

The second is organizational proportionality, as defined by the Basel Committee on Banking Supervision (2022): maintaining, validating, and auditing a model is part of the model itself, and an organization of seven people without an independent risk function cannot sustain it. The third

relates to governance: in a collectively owned entity, denying credit to a member must be justifiable to the general assembly, and a score based on four components is justifiable; the output of a set of decision trees is not. This is not a technical limitation but a regulatory requirement stemming from the organization's cooperative nature.

Advanced analytics is not ruled out. By design, the matrix generates a structured record of every decision (variables, assessments, scores, and outcomes) which, accumulated over more than 8,800 transactions, constitutes the missing input for future statistical calibration. The tool is not an alternative to statistical scoring, but rather its enabling condition: first the rule that produces the data, then the model that exploits it.

Conditions for Replicability and Limitations of the Study

Replicability in other institutions at the grassroots level rests on four premises that do not require significant investment: the governing body's commitment to a written risk policy, the availability of historical information, the designation of a function responsible for risk (even if it is not a separate unit), and a willingness to document decisions. The only relevant recurring expense is consulting the bureau, which is marginal compared to the expected loss it prevents. The tools operate using spreadsheets, without specialized software.

The weightings (forty, twenty-five, twenty, and fifteen points) are an initial calibration, not a universal parameter: a portfolio without payroll deductions will assign greater weight to the qualitative component and to collateral; one consisting of microentrepreneurs will require greater detail in the income matrix. What remains constant is not the weight vector, but the four-component structure, the directional asymmetry, and the verifiability of the documentation.

The stated limitations qualify these assertions: the single-case study allows for analytical, not statistical, inference; expert validation is underway and may require recalibration; and the matrix was applied to a typical profile, not to all applications, so while it demonstrates operational feasibility, it does not yet measure the aggregate effect on the portfolio.

Implications for Public Policy and Supervision

Three implications extend beyond this specific case. Regarding the regulatory scope: 1,600 organizations that manage community savings under self-regulation constitute a large group whose aggregate risk is not currently measured by anyone; equipping them with proportionate prudential tools is a low-cost financial stability policy. Regarding supervisory indicators: if delinquency can be 0.25% with a concentration of 6,311 points, scorecards based solely on portfolio quality are insufficient concentration by source of repayment should be incorporated into regulatory reporting. Regarding credit information: the lack of systematic consultation with the credit bureau at the grassroots level creates a negative externality: the debtor's financial burden remains invisible precisely to the institutions that serve the most vulnerable.

Conclusions

This chapter set out to formalize the principle of prudence as an operational category for microcredit assessment and to translate it into a tool applicable to small-scale institutions. This objective has been met, and the hypothesis is supported by the analyzed evidence.

On a theoretical level, the main contribution shifts prudence from the convention of accounting recognition toward the production of information that underpins credit decisions. This shift transforms a diffuse value into rules verifiable by a third party, with explicit components, directional asymmetry justified by the concavity of the creditor's payment function, and documentary verification. Prudence ceases to be a matter of the analyst's character and becomes a property of the procedure: teachable, replicable, and auditable.

On a methodological level, the matrix of four weighted components offers the rank-and-file staff an alternative that does not force them to choose between undocumented intuition and unsustainable analysis: it structures the committee's judgment without replacing it, leaves an auditable record, and produces the standardized log that, when accumulated, will serve as the input for future statistical calibration.

On an empirical level, the application to this case demonstrated the instrument's effectiveness and its informational value. In an institution with the best indicators in its sector (a delinquency rate of 0.25%, a provision coverage ratio of nearly seven times, and a solvency ratio close to 40% of assets), the prudential criteria revealed what conventional indicators did not show: an expected loss of 0.69% of the portfolio, a concentration of 6,311 points triple the alert threshold an equity impact of up to 9.4% in the combined scenario, and a liquidity gap exceeding available funds. The matrix applied to the typical case showed that the actual ratio of debt service to income is nearly double that of current practice.

Hence the chapter's central thesis: formal risk management is not redundant where delinquency is low; it is what prevents low delinquency from turning into a crisis when the mitigating factor that sustains it fails. An institution can simultaneously exhibit indicators of excellence and critical vulnerabilities, because they belong to different planes: actual performance and the structure of latent dependency. Confusing them is the sector's most costly diagnostic error and the one that formalized prudence prevents.

Hence the response to the "inclusive" objection: prudence a rule for processing information, not for raising the admission threshold does not restrict access to credit; it reveals the applicant's true standing and enables the structuring of the transaction rather than approving it blindly. Sustainable financial inclusion is not achieved by lending without measuring, but by measuring sufficiently to be able to continue lending; in organizations that manage their members' savings, measuring is a fiduciary obligation, not a technical recommendation.

Areas for further work remain open: validation through structured consultation with experts currently underway which may require recalibrating components and weightings; prospective comparison of decisions made with and without the matrix in parallel cohorts; application to institutions without payroll deductions, a more rigorous test of the qualitative component; and extension to the entire low-income segment to quantify an aggregate risk that no one currently measures. In all these cases, the proposed framework offers an operational starting point and a falsifiable hypothesis.

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Methodological Abundance and Epistemological Poverty: The Silent Crisis in University Educational Research

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Introduction

In the current context of higher education, educational research faces a silent yet persistent paradox: while there is growing methodological sophistication and an increasingly standardized use of research designs, techniques, and instruments, there is simultaneously a concerning weakness in the epistemological foundation that should guide these processes. This tension has led to research practices characterized by an excessively operational emphasis, in which methodology is applied as a set of technical procedures disconnected from a profound reflection on the nature of knowledge, the assumptions that underpin it, and the type of scientific truth that is intended to be produced.

Epistemology, understood as the philosophical discipline that studies the foundations, limits, and validity of scientific knowledge, constitutes a central pillar of research practice. However, in numerous academic works particularly undergraduate and master's theses, scientific articles its presence is reduced to superficial mentions or, in many cases, is completely absent. This deficiency not only undermines the internal coherence of research but also limits researchers' critical capacity to justify their methodological decisions and understand the theoretical, ethical, and contextual implications of their scientific output. Various specialists in the epistemology of education have warned that the omission of a solid epistemological foundation leads to a fragmented understanding of science and to the uncritical reproduction of standardized research models models centered on the instrumental application of methods and techniques but disconnected from deep reflection on the foundations of scientific knowledge (Isea-Argüelles et al., 2025; Zamudio Gómez, 2012; Cunha, 2011).

From this perspective, the crisis in university educational research does not stem from a lack of methods, but rather from the profound disconnect between epistemology and methodology. When research is reduced to the technical mastery of designs, instruments, and procedures without explicit reflection on the assumptions underpinning them methodology is stripped of scientific meaning and becomes a merely operational practice. This separation leads to research that is formally correct but epistemologically fragile, incapable of justifying the conception of knowledge, reality, and validity from which educational knowledge is produced. Epistemological training allows us precisely to examine these decisions and prevent methods from being adopted as formulas independent of the problem and the context (Andrade Salazar & Rivera Pérez, 2024; Guilfoyle et al., 2024).

Within this framework, the following research question arises: How does the disconnect between epistemology and methodology manifest itself in university educational research, and what are its implications for the validity of the knowledge produced?

In the university setting, this issue is particularly evident in the training of researchers. A review of scientific articles, master's theses, and undergraduate theses reveals that, in the methodological section, a procedural logic predominates that prioritizes compliance with

formats and protocols over epistemological reflection. This results in research that is technically sound but conceptually fragile, where the paradigm, the subject–object relationship, the conception of reality, and the criteria for scientific validity remain implicit or nonexistent. This situation reinforces a scientific oversimplification that weakens the real impact of educational research and limits its transformative capacity.

Given this scenario, it becomes essential to restore epistemology's role as the normative foundation and mediator of the research process. More than a theoretical complement, epistemology constitutes a condition of possibility for the production of valid, relevant, and socially significant knowledge. In this sense, the purpose of this chapter is to critically analyze the silent crisis in university educational research characterized by methodological abundance and epistemological poverty based on a review of scientific articles, master's theses from a private university, and undergraduate papers from a public university. The scientific contribution of this chapter lies in identifying and systematizing recurring patterns of epistemological poverty in university academic outputs, demonstrating that the disconnect between epistemology and methodology is not an isolated problem but rather a trend that cuts across different levels and fields of education. Furthermore, it contributes to the field of the epistemology of education by proposing a critical analysis of university research practices, in which scientific validity is not reduced to methodological compliance but rather to the coherence between epistemological stance, methodological decisions, and the type of knowledge produced. In this way, the chapter offers a theoretical foundation for rethinking university research training and reestablishing epistemology as a central criterion for rigor, validity, and scientific transformation.

The Epistemological Crisis in University Educational Research

Educational research in the contemporary university context is marked by a structural tension that, although not always visible, directly affects the quality of the knowledge produced. This tension is expressed in the coexistence of growing methodological sophistication with a progressive weakening of epistemological foundations, giving rise to what might be called a silent epistemological crisis. This is not a matter of an absence of scientific output or a lack of methods, but rather a transformation in the way research is conceived and practiced, where the emphasis shifts toward the operational at the expense of reflection on knowledge.

From an epistemological perspective, scientific research cannot be reduced to the application of techniques or the execution of pre-established designs (Kuhn, 1962; Popper, 2002). Epistemology fulfills an essential normative function, in that it allows us to define the object of knowledge, justify methodological decisions, and establish the criteria for scientific validity that guide the research process (Zamudio Gómez, 2012). Without this foundation, methodology loses its unifying purpose and becomes a set of procedures disconnected from a coherent conception of reality, knowledge, and the relationship between the researcher and the object of inquiry.

Various authors have warned that the omission of epistemological reflection in research training leads to a fragmented understanding of science and to the uncritical reproduction of standardized methodological models. In this regard, Isea-Argüelles et al. (2025) argue that the absence of epistemological training fosters research practices centered on the instrumental application of methods, without a critical examination of their foundations. Similarly, Cunha (2011) emphasizes that educational research requires reflective processes that enable an understanding of the complexity of knowledge, beyond its technical operationalization.

In the field of teacher education, this issue takes on an even more critical dimension. As Trejo Chamorro and Huayta-Franco (2024) point out, epistemology remains an unresolved challenge in the training of researchers, insofar as it is not systematically integrated into training processes. This absence limits researchers' ability to articulate theory, method, and practice, resulting in research that is formally correct but epistemologically weak.

From this perspective, the epistemological crisis cannot be understood as an isolated problem, but rather as a structural condition of contemporary university educational research. The proliferation of approaches, designs, and techniques does not guarantee the production of rigorous knowledge if these decisions are not grounded in an explicit and coherent epistemological stance. On the contrary, this methodological abundance, when not accompanied by deep epistemological reflection, contributes to the consolidation of research practices that prioritize technical compliance over a critical understanding of knowledge.

Consequently, approaching educational research from an epistemological perspective implies recognizing that scientific validity is not defined solely by methodological correctness, but by the coherence among theoretical assumptions, methodological decisions, and the type of knowledge intended to be produced. This understanding is fundamental for overcoming the scientific oversimplification that characterizes university research and for reconfiguring the research process as a reflective, critical, and contextualized endeavor.

Educational Research as an Operational Practice: An Approach Based on Document Analysis

Understanding the issues raised in this chapter required framing research not as a technical exercise, but as a process of critical analysis aimed at uncovering the logics underlying the production of knowledge in the university setting. In this regard, we opted for a qualitative approach of an analytical–interpretive nature, not with the purpose of measuring variables or establishing causal relationships, but rather to examine how research thinking is configured in specific academic outputs.

The starting point was the recognition that the methodological section of research papers provides a prime opportunity to identify not only technical decisions but also and above all the epistemological assumptions that guide those decisions, whether explicitly or implicitly. From this perspective, the analysis did not focus on evaluating the technical quality of the studies, but rather on understanding the coherence or incoherence between epistemology, method, and the production of knowledge.

To this end, we conducted a documentary analysis of academic research outputs corresponding to different levels of university education and disciplinary fields.

The corpus consisted, first, of 45 academic articles written by students in master's programs related to the field of education, from the years 2024 and 2025, submitted for evaluation by the respective academic committee.

In addition, 57 research projects conducted in 2024 were examined; these were submitted as a prerequisite for obtaining a master's degree at a private university in Ecuador and also belonged to programs related to the field of education.

In addition, the corpus included 18 research papers corresponding to undergraduate projects, written by students at a public university, specifically in majors related to the field of Software

Engineering within the Faculty of Mathematical and Physical Sciences. These papers were accessed through the institution's publicly accessible repository and cover the period from 2019 to 2025. The breadth of this period which was longer than that of the other two groups in the corpus was due to the actual availability of open-access papers in the institutional repository at the time of the literature review, rather than to a selection criterion that differentiated between educational levels.

The selection of these documents was based on a deliberate criterion aimed at capturing a broad and relevant overview of contemporary research practices in the university setting. Specifically, the documents were selected based on previously defined inclusion criteria. First, only academic outputs linked to university research training processes were considered, such as articles derived from master's programs, scientific projects for graduate degrees, and undergraduate research papers. Second, documents that included a well-developed methodological section were included, since this constituted the main focus of the analysis. Third, priority was given to works from different educational levels and disciplinary fields, with the aim of determining whether the disconnect between epistemology and methodology was evident across the board in university research output. Finally, the accessibility of the documents was considered: in the case of graduate-level works, access was obtained through academic review processes; whereas, for undergraduate works, documents available in publicly accessible institutional repositories were used.

The unit of analysis consisted of the statements through which each document defined its paradigm, approach, design, method, techniques, analytical procedures, and validity criteria. Attention was also paid to the relationship between these decisions and the formulation of the problem, the objectives, the type of evidence collected, and the scope of the conclusions. This distinction made it possible to differentiate between two aspects that are often conflated: on the one hand, the formal presence of methodological components, and on the other, the epistemological justification for why those components were appropriate for producing a specific type of knowledge. Thus, a document might present the population, sample, and instruments with apparent technical accuracy while, at the same time, failing to address which conception of reality guided the study, what relationship was established with the participants, or under what conditions their statements could be considered valid.

The analysis process was based on an analytical and comparative reading of the documents, focusing on how the methodological section was structured and justified. This exercise made it possible to identify patterns, omissions, and tensions in the way the studies justified their research decisions. Rather than seeking statistical generalizations, the focus was on recognizing recurring patterns that reveal trends in the conception and practice of educational research.

To guide this analysis, categories were defined to help problematize the relationship between epistemology and methodology. Among these are the explicit articulation or absence of an epistemological stance; the coherence between paradigm, approach, and method; the conceptual differentiation between epistemology and technique; the justification of criteria for scientific validity; and the predominance of a reflective or merely operational logic. These categories were not conceived as measurement instruments, but rather as interpretive frameworks that made it possible to interpret the meaning of methodological decisions in relation to their epistemological foundations.

This approach revealed that, in many cases, university research is shaped as a practice oriented toward meeting formal requirements rather than the reflective construction of knowledge.

Methodology, rather than emerging from a clearly defined epistemological stance, appears as a preestablished component that is incorporated into research work almost automatically. Thus, the research process shifts toward an operational logic, where the application of techniques and procedures takes precedence over the critical examination of the knowledge produced.

Consequently, the documentary analysis not only allowed us to identify characteristics of the reviewed works but also to understand a particular way of conceiving research in the university context: a practice in which method precedes thought and where methodological structure takes precedence over epistemological reflection. This finding is fundamental to understanding the manifestations of epistemological poverty that will be discussed in the following sections.

Manifestations of Epistemological Poverty in Research Output

The analysis conducted identified a series of patterns that reveal not only specific deficiencies in the methodological formulation of the reviewed works but, more profoundly, a structural configuration of university research characterized by the weakness of its epistemological foundation. These manifestations do not appear as isolated errors but as recurring patterns that cut across different levels of education and disciplinary fields, allowing them to be recognized as expressions of a widely normalized research logic.

One of the manifestations identified is the explicit absence of epistemological stances in the methodology section. The documents analyzed included studies that made no reference to the paradigm from which knowledge is produced, to the conception of reality, or to the relationship between the subject and the object of study. In these cases, epistemology remains implicit or absent, making it difficult to understand the foundations upon which the adopted methodological decisions are based.

This empirical finding corroborates, at the documentary level, the normative function that Zamudio Gómez (2012) attributes to epistemology as the foundation of methodological decisions: when this function is omitted, the research loses the criterion that would allow it to justify why a particular methodological approach is appropriate for producing a specific type of knowledge.

Similarly, there is conceptual confusion between "paradigm," "approach," and "method," in which these elements are used interchangeably or reduced to operational categories. In several studies, the quantitative, qualitative, or mixed approach is treated as equivalent to the epistemological paradigm, while the type of study is presented as sufficient grounds to justify the research. This conceptual blurring reveals a fragmented understanding of the research process, in which the differences between levels of scientific reflection are obscured.

This lack of distinction can be interpreted in light of Kuhn (1962), for whom a paradigm constitutes a shared framework of assumptions, problems, and research criteria and not merely a technical or procedural choice. Reducing it to a methodological classification strips the concept of its structuring function in the production of knowledge.

Another significant manifestation is the predominance of a procedural logic, in which methodology is structured as a sequence of standardized steps design, population, sample, instruments, and data analysis without an epistemological justification that articulates these decisions. In such cases, research is oriented toward meeting formal requirements, prioritizing the technical organization of the study over an understanding of the knowledge it aims to produce.

This logic illustrates, at the documentary level, Cunha's (2011) warning about the risk that educational research may be reduced to the mechanical application of techniques, without the reflective process that would allow for an understanding of the complexity of the knowledge it seeks to produce.

In the same vein, claims of educational or social impacts lacking epistemological grounding were identified. Some studies assert improvements, transformations, or contributions without explicitly stating the validity criteria that support such claims. The " " impact thus appears as an expectation or a general statement, disconnected from the actual scope of the methodological design and the assumptions underpinning it.

The gap between evidence and impact was particularly evident when immediate changes in scores, favorable perceptions, or satisfaction levels were used to support longer-term educational transformations. A change following an intervention may constitute a relevant indicator, but it does not, on its own, demonstrate stability, transferability, or causality. Similarly, participants' positive evaluations provide insight into acceptability, though they do not automatically equate to pedagogical effectiveness. Epistemological reflection requires distinguishing between these levels and formulating conclusions commensurate with the design, duration of observation, and nature of the data. This commensurability does not weaken the study; on the contrary, it strengthens its credibility by making transparent the conditions under which the knowledge can be applied.

Among the documents examined, we identified instances of quasi-experimental designs being used in master's-level research without sufficient critical scrutiny. In certain cases, educational interventions were implemented over very brief periods as short as two weeks and conclusions were subsequently drawn regarding the resolution of complex problems or improvements in learning. Cases were also observed involving small samples and conclusions that went beyond the specific conditions of the study. These situations highlight the need to define the scope of the results and explicitly state the limitations, without attempting to determine their frequency or distribution across the categories in the corpus.

Likewise, the analysis made it possible to identify these issues in different types of documents within the corpus, although the available qualitative review does not allow for determining their frequency or making quantitative comparisons among the three categories. In articles and projects related to master's programs, cases were identified in which the approach and design were formally stated without justifying the underlying assumptions of knowledge, as well as works in which the conceptual foundation and technical decisions appeared juxtaposed. In the undergraduate engineering papers reviewed, cases were identified that were primarily focused on describing processes, tools, and development phases. These findings are limited to the documents examined and do not aim to characterize or generalize about any of the disciplinary fields represented.

In the cases noted in the field of engineering, the formal inclusion of a methodological section without a sufficiently developed epistemological framework is significant. The documents describe processes, tools, and phases of technological development, but do not always justify the type of knowledge produced or the epistemological framework within which they are situated. Cases were also identified in which approaches typical of the social sciences were applied to technological projects without an explicit justification of their relevance or adaptation to the object of study.

Table 1. *Conceptual synthesis of the manifestations of epistemological poverty identified in the corpus*

Identified manifestation	Described qualitative evidence	Epistemological implication	Theoretical basis
Absence of an explicit epistemological stance	Omission or implicit treatment of the paradigm and assumptions about reality, knowledge, and the subject-object relationship.	Makes it difficult to justify the correspondence between the problem, the evidence, and the methodological decisions.	Zamudio Gómez (2012)
Confusion between paradigm, approach, and method	Indistinct use of concepts that correspond to different levels of reflection and research decision-making.	Fragments the coherence of the design and reduces the paradigm to a procedural classification.	Kuhn (1962)
Predominance of a procedural logic	Presentation of methodology as a sequence of steps, components, and formal requirements.	Reduces research to a technical operation disconnected from reflection on knowledge.	Cunha (2011)
Claims of impact without epistemological grounding	Claims of improvement or transformation that are not defined in accordance with the study design and available evidence.	Weakens the validity and credibility of the conclusions drawn.	Lincoln and Guba (1985, 1988)
Premature generalization	Conclusions that go beyond the conditions of small samples or short-term interventions.	Exceeds the scope of the study design and overlooks alternative explanations and contextual limitations.	Popper (2002); Lincoln and Guba (1985)
Uncritical transfer of disciplinary frameworks	Application of social science approaches to technological projects without sufficiently justifying their relevance.	This results in mismatches between the nature of the subject, the method, and the required evidence.	Sousa Santos (2010, 2014)

Note. The table conceptually organizes the manifestations identified during the analytical reading of the corpus. Its purpose is to synthesize the qualitative findings described in the section; it does not represent a frequency count nor does it establish quantitative differences between the types of documents examined.

Taken together, these manifestations help us understand that epistemological poverty is not a marginal phenomenon, but rather a structural condition of university research production. Research is thus configured as a practice in which methodological compliance takes center stage, while epistemological reflection is diluted or omitted, generating a form of knowledge that, although formally organized, lacks the depth and coherence necessary to sustain its scientific validity (Lincoln and Guba, 1985, 1988).

Scientific Simplification and Epistemological Shift: Implications for Research Training

The phenomena identified in university research output cannot be understood solely as technical deficiencies or limitations in the application of methods, but rather as expressions of a deeper process of scientific simplification, in which research has been progressively reduced to its operational dimension. This simplification occurs when methodology becomes the central axis of the research process , displacing the epistemological reflection that should provide meaning, coherence, and validity to the knowledge produced (Habermas, 1984; Sousa Santos, 2010, 2014).

In this context, the abundance of methodological approaches, designs, and techniques does not necessarily lead to stronger research; on the contrary, it may contribute to the consolidation of research practices focused on the formal compliance with procedures. As the findings in this chapter demonstrate, methodology has become normalized as a set of steps to follow, disconnected from the epistemological assumptions that should guide it. Thus, research ceases to be a process of critical knowledge construction and instead becomes an activity regulated by standardized formats, structures, and protocols.

This situation has been widely problematized in the field of the epistemology of education. Zamudio Gómez (2012) notes that epistemology fulfills an indispensable normative function, in that it provides a foundation for methodological decisions and establishes criteria for scientific validity. When this function is weakened or neglected, research loses its ability to coherently articulate theory, method, and practice, resulting in scientific outputs that are formally correct but conceptually fragile.

Along the same lines, Cunha (2011) argues that educational research should be understood as a reflective process aimed at developing critical awareness of knowledge, which implies moving beyond the mechanical application of techniques. However, the results show that this reflective dimension has been sidelined, giving way to a logic in which knowledge is produced without a critical examination of its foundations.

The studies by Isea-Argüelles, Romero-Fernández, and Aldana-Zavala (2025), as well as the contributions by Trejo Chamorro and Huayta-Franco (2024), agree that the absence of epistemological training in higher education fosters the uncritical reproduction of standardized methodological models. This situation not only limits the quality of research but also shapes the training of researchers, who learn to apply methods without fully understanding the meaning of the research process.

From a recent perspective, Guilfoyle et al. (2024) show that research experiences in initial teacher education can contribute to the development of epistemic beliefs, while Korom et al. (2025) demonstrate that these beliefs take on different forms depending on the domains of knowledge. These contributions help us understand that epistemology is not merely a decorative addition to the research process, but rather a formative dimension that influences how evidence is evaluated, how claims are justified, and how the limits of the knowledge produced are recognized.

From a more recent perspective, the views shared by D. Vélez during the Postdoctoral Seminar (personal communication, February 14, 2026) are particularly illuminating in asserting that epistemology is not merely a complement to the research process, but rather its condition of

possibility. In this sense, the absence of an explicit epistemological stance creates what might be called a structural weakness in research, where methodological procedures even when correctly executed lack a foundation that guarantees the validity of the knowledge produced.

Based on this intersection of empirical evidence and theoretical grounding, it is possible to argue that university educational research is undergoing a silent crisis. This crisis does not manifest itself in a lack of academic output, but rather in the normalization of research practices that prioritize speed, operational efficiency, and standardization, to the detriment of epistemological reflection. Research is produced, circulated, and institutionally validated but it does so within weakened epistemological frameworks, which compromises its explanatory, comprehensive, and transformative capacity.

The implications of this situation for research training are profound. First, a training model is taking shape in which future researchers acquire technical skills but do not develop a critical understanding of the knowledge they produce. Second, an academic culture oriented toward meeting indicators and standards is becoming entrenched, in which research is evaluated more for its form than for its substance. Finally, this logic limits the possibility of generating situated, relevant, and transformative knowledge capable of addressing the complexities of contemporary educational contexts.

Consequently, overcoming this crisis does not involve incorporating new methodologies or refining research designs, but rather reestablishing epistemology as the central axis of the research process. This entails rethinking the training of researchers, strengthening the dialogue between theory and method, and embracing research as an intellectual process that demands reflection, justification, and an explicit epistemological stance. Only through this reconfiguration will it be possible to move toward university-level educational research that not only produces knowledge but does so with rigor, coherence, and a transformative purpose.

Conclusions

This chapter began with a central thesis: university educational research is undergoing a silent crisis characterized by methodological abundance accompanied by persistent epistemological poverty. Far from being a technical or procedural problem, this crisis manifests itself in the disconnect between epistemology and methodology, which reduces research to an operational exercise devoid of deep scientific reflection.

The results of the literature review confirm this problem. The explicit absence of epistemological stances, the confusion between paradigm, approach, and method, the predominance of a procedural logic, the assertion of impacts without epistemological grounding, and the uncritical use of quasi-experimental designs with hasty generalizations constitute recurring patterns across the various levels of university education analyzed. These findings demonstrate that methodology, when not grounded in epistemological reflection, becomes a set of standardized steps that create the appearance of scientific rigor without guaranteeing the validity of the knowledge produced.

The implications of this situation for university educational research are significant. First, it undermines the training of researchers capable of critically justifying their scientific decisions and understanding the true scope of the results they produce. Second, it normalizes a research practice centered on compliance with formats, deadlines, and productivity indicators, to the detriment of the construction of explanatory, comprehensive, and contextualized knowledge.

Finally, in the engineering documents included in the corpus, we observed the unquestioned adoption of frameworks typical of the social sciences; this finding is limited to the sample reviewed and does not constitute a general statement about the field of engineering.

Given this scenario, it becomes essential to reclaim epistemology as a normative criterion for scientific validity in university research. Epistemology cannot continue to be treated as an ancillary or implicit component of the research process, but rather as the central axis that allows us to define the object of knowledge, ground the method, establish criteria for validity, and give meaning to the stated impact. Reviving the epistemological reflection implies rethinking research training, strengthening the dialogue between theory and method, and embracing research as a critical and responsible intellectual process.

In conclusion, overcoming the silent crisis in university educational research does not depend solely on incorporating new methodologies or refining technical procedures, but rather on reestablishing epistemology at the center of scientific practice. The main contribution of this chapter is to demonstrate that epistemological poverty is not an isolated weakness in certain academic works, but rather a recurring pattern that affects the way research is conceived, justified, and validated in the university context. By identifying these manifestations and linking them to research training, the chapter offers a critical analysis that helps us understand the need to reorient research teaching processes toward the articulation of paradigm, method, validity, and knowledge production. Only through this renewal will it be possible to move toward rigorous, coherent, and truly transformative educational research.

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Gamification as a Learning Strategy for Students with Mild Intellectual Disabilities and the Role of Teacher Training

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Introduction

Digital technologies have changed the ways in which students access, interact with, and participate in school environments. Gamification has emerged as a significant strategy that incorporates game elements such as challenges, levels, feedback, progression, and symbolic or narrative rewards into activities whose primary purpose is not play but learning. Its educational value lies not only in making a class more engaging but also in enabling the creation of experiences with clear objectives, immediate feedback, and opportunities for gradual progress (which is particularly valuable in heterogeneous classrooms if the design is guided by learning objectives rather than technological novelty).

Recent literature on personalized gamification specifically warns that its effects depend on how game elements are selected and tailored to students' characteristics and responses (Hong et al., 2024). This discussion is particularly relevant to the education of students with mild intellectual disabilities. Educational inclusion is not merely about having the student physically present in a mainstream institution; it requires conditions that enable understanding, participation, progress, and the demonstration of learning with appropriate supports. For the authors, teacher support is essential, with teachers assuming an inclusive and humanistic role and designing gamification activities adapted to the specific needs of students with mild intellectual disabilities.

In Ecuador, the Organic Law on Intercultural Education includes inclusive education as one of the obligations of the educational system (Ministry of Education 2021). From this perspective, the challenge is not simply integrating a digital platform, but rather determining which barriers to reduce, which skills to strengthen, and what accommodations each student needs to participate on an equal footing. Tailoring approaches to each specific need allows for the creation of a range of opportunities; however, for many institutions in Ecuador, the acquisition of technological resources is often conflated with educational inclusion, hindering the ability to provide a diversity of learning opportunities for students with mild intellectual disabilities.

The evidence allows us to seek reasons to explore the potential of playful-digital environments, but it also compels us to avoid drawing simplistic conclusions. Therefore, game-based resources become valuable only when they are truly adapted to the characteristics of each student. Derks et al. (2022), in a meta-analysis of RCTs involving children with intellectual disabilities and/or certain adaptive and cognitive impairments, highlighted the heterogeneity among the studies and the need to continue identifying the factors responsible for the observed effects; meanwhile, research on the personalization of gamification shows that the adaptation of elements, immediate feedback, and tracking of student data are central dimensions of the design (Hong

et al., 2024). Given that a key variable is the personalization of gamification taking into account feedback regarding the positive or negative effects of gamification

Therefore, gamification should not be presented as a one-size-fits-all solution, but rather as a strategy whose pedagogical decisions require sound foundations. The central issue, then, lies between technological potential and pedagogical capacity. Having digital resources does not guarantee inclusive use; a teacher's digital competence consists of selecting, adapting, and evaluating tools with pedagogical knowledge and understanding students' support needs (Ralda et al., 2024) institutional maturation processes must develop this competence; it should not be developed in isolation but must be part of an extremely broad institutional process, yet aligned with educational objectives. In the context of inclusion, it is not enough for a teacher to simply master digital tools; rather, they must be able to adapt their use to the specific needs of each student. Without this adaptation, there is a risk that the tools will become obsolete in relation to classroom needs.

Guevara (2024) emphasizes its importance in educational processes for students with mild intellectual disabilities; this should be reflected in concrete decisions: adjusting the complexity of challenges, reducing distractions, providing visual aids, diversifying feedback, allowing for repetition, and adjusting response times. Adaptations do not have to be one-size-fits-all; rather, they should combine strategies that allow students with mild intellectual disabilities to participate in real-world contexts. This approach gains greater significance when making decisions that align with reality while preserving equity and equality, since the true challenge lies not in designing easier activities but in making modifications according to students' cognitive level requirements.

These considerations lead to the question for this chapter: How can gamification support inclusive learning for students with mild intellectual disabilities, and what teaching competencies are needed to use it pedagogically in general basic education? The objective is to critically discuss the potential and conditions for using gamification as an inclusive learning strategy (evidence on intellectual disability, personalization, digital competence, and teacher training). The chapter's contribution is that we shift the debate away from the instrumental adoption of platforms toward an inclusive pedagogical design where technology is valued for its ability to reduce barriers and increase opportunities for participation.

Gamification as a Pedagogical Tool: From a Recreational Resource to Learning Design

First, a conceptual clarification is needed: gamification does not mean turning everything into a video game. Gamification reorganizes an educational experience with elements that make progress visible, provide feedback, and offer meaningful challenges. This distinction is important because it prevents the strategy from being reduced solely to the use of points or rewards. Prieto et al. (2021) link gamification to motivation and educational performance, while D'Santiago (2023) links gamification and game-based learning to teaching strategies. Both help us recognize that pedagogical value depends on the coherence between the proposed dynamics and the cognitive task intended to be developed.

From an inclusive perspective, the question should not be which platform to use, but rather what experience the student needs to make progress. If a student needs more anticipation, then the activity could include a visual sequence of steps; if more time is needed to process instructions, then pauses and repetitions of challenges; if negative feedback causes frustration, then the

system can prioritize guidance messages and new opportunities to respond. Hong et al. (2024) show that adaptive and personaliz y gamification relies on different types of game elements and that capturing dynamic student data can guide changes during learning, so that gamification shifts from a one-size-fits-all model to a design that is sensitive to diversity.

Motivation is important, but not constant entertainment: an activity may be fun but contribute little to learning if the student is only interested in accumulating points without understanding what is being learned. Therefore, game mechanics should reinforce cognitively relevant actions: comparing, classifying, remembering, explaining, solving, choosing, and collaborating. Immediate feedback (if provided) can be useful when it explains why an answer makes sense or offers a hint to correct it; it loses value if it is merely a reward or punishment without guiding the process. For students with mild intellectual disabilities, this distinction is critical because the quality of instructions and the opportunity to practice with support facilitate independent participation.

The findings of Derks et al. (2022) provide another reason to maintain a balanced perspective: the positive effect on adaptive and cognitive skills does not eliminate the heterogeneity among interventions. The effectiveness of a serious game may vary depending on age, duration, type of skill, support provided, and design characteristics, among other factors; therefore, transferring a successful resource from one context to another without adjustments may yield different results. Teaching practice requires general evidence combined with situated assessment: whether the student understands what is happening, whether the activity increases participation, whether the required support gradually decreases, or whether learning transfers to non-gamified tasks.

Gamification can also support cooperative learning. Villegas and Ramos (2025) discuss the relationship between collaborative work and social skills in special education. In an inclusive design, group missions can distribute responsibilities and allow each student to contribute based on their strengths, but cooperation must be structured: when competition publicly exposes mistakes or rankings are rigid, it reinforces performance differences and affects perceptions of competence. Inclusion means that progress indicators recognize individual progress, peer support, and the achievement of shared goals; comparison is not the focus of the experience.

Positive results with gamified strategies have also been reported in Ecuador. Villamar Cevallos et al. (2024) compared a group that engaged in gamification activities with another that received traditional instruction and found improvements in the academic performance of the experimental group. These results demonstrate the pedagogical potential of gamification, although it cannot be limited to isolated rewards or game mechanics; rather, it must be linked to learning objectives and student characteristics.

Mild Intellectual Disability, Participation, and Personalization of Learning

Mild intellectual disability entails diverse educational needs that cannot be addressed with a single adaptation. Students differ in processing speed, working memory, verbal comprehension, planning, generalization of learning, and autonomy in task execution; therefore, the diagnostic category should not be used as a pedagogical blueprint for inclusion it is necessary to understand the student within their context (by designing supports that address specific barriers).

Pérez Vera et al. (2024), in analyzing teachers' perceptions of the inclusion of students with disabilities, position the teacher as a key actor in bringing inclusive practic to life: shifting from a

deficit-based approach to one that supports participation. Within this framework, gamification opens up possibilities for personalization because it breaks down a complex task into intermediate goals and makes progress visible: levels can organize content from simple to more complex; hints can serve as scaffolding; repetition can be used without being penalized; and achievements can recognize specific progress.

Padilla Galeas et al. (2025) report on digital gamification as a means to strengthen cognitive skills in students with mild intellectual disabilities in inclusive classrooms. The results of a single study should not be automatically generalized, but their approach aligns with the need to design adjustable activities related to specific cognitive skills. International evidence indexed in ScienceDirect shows that analyzing digital resources is relevant for this population. Derks et al. (2022) demonstrated small but significant effects of serious games on adaptive and cognitive skills in children with intellectual disabilities and/or autism.

More recently, Frisch et al. (2025) observed the participation of students with intellectual disabilities in digital activities using iPads: access to the device alone does not guarantee equal participation; students with intellectual disabilities needed support to participate effectively. This contrast is important because technology can open up opportunities, but it can also reveal new inequalities if the activity design does not include mediation and accessibility.

Personalization must include at least four dimensions: cognitive (information presented, complexity of instructions, sequences, and number of response options); temporal (activity duration, breaks, repetitions, and pace of progression); communicative (clear language, visual aids, demonstrations, and understandable feedback); and motivational (student interests, tolerance for competition, and individual or collaborative activities). Hong et al. (2024) state that adapting gamification requires considering student data and profiles to support a flexible, non-standardized approach to game mechanics.

In the area of digital accessibility, Muñoz Morán (2023) analyzes social perceptions and the digital inclusion of students with intellectual disabilities. This dimension is important because barriers are not solely technical: low expectations, overprotection, or the notion that some students cannot use technology independently also limit opportunities. An inclusive gamified approach should provide support but not unnecessarily replace the student's own actions gradually increasing their control over the task so that assistance is phased out when it is no longer needed.

The selection of tools should follow the same principle. Educaplay, for example, allows users to create quizzes, crossword puzzles, matching exercises, and other multimedia activities. Pacheco et al. (2025) study it as a resource for strengthening reading comprehension, while Alcívar Macías et al. (2025) approach it as a teaching strategy in language and literature. These studies do not focus exclusively on mild intellectual disabilities; therefore, they do not constitute direct evidence of effectiveness for this population. Their value within this chapter lies in demonstrating the functional possibilities of a platform that teachers can adapt. The decision to use it should be based on the accessibility of the specific activity, not on the tool's reputation.

Assessment is the component that allows us to determine whether personalization is effective. Teachers need to record observable indicators: level of assistance required, number of attempts, response time, accuracy, persistence on the task, transfer of learning , and peer interaction. The score generated by a platform can complement, but not replace, pedagogical assessment. One student might earn more points through repetition without having developed transferable understanding; another might progress slowly but demonstrate greater autonomy. Contextual

interpretation of this data prevents gamification from becoming a superficial measure of performance.

Teacher Training and Digital Competence for Inclusive Gamification

Teacher training is the link between a tool's potential and its transformation into an inclusive educational experience. Aguirre and Loza (2020) argue that initial teacher training is a process that influences pedagogical practice; Mena et al. (2024) highlight the importance of training teachers in Ecuador's basic education system. For the purposes of this chapter, training cannot be reduced to knowing where the buttons are on a platform: teachers need to know why they choose a particular mechanic, which barrier they want to reduce, what evidence to look for, and what adjustments to make if the activity does not produce the expected response.

Therefore, digital competence for teachers becomes a situated pedagogical competence. Ralda et al. (2024) link its improvement to institutional digital maturity; this is especially relevant in the context of inclusion: a teacher may design a good activity, but limitations arise if the institution lacks connectivity, devices, technical support, planning time, or accessibility policies. The responsibility should not fall solely on individuals.

Professional development requires support, communities of practice, and organizational conditions where resources can be tested, evaluated, and improved. Guevara (2024) emphasizes the role of teachers' digital competencies in educational processes. To support students with mild intellectual disabilities, these competencies can be grouped into five interconnected areas: pedagogical (objectives, task sequencing, and strategy selection), technological (platform management and troubleshooting basic usage issues), inclusive (identifying barriers, making reasonable accommodations, and designing supports), evaluative (interpreting data and evidence of learning), and ethical (data protection, avoiding unnecessary exposure of performance, and ensuring technology does not lead to exclusion).

The teacher's attitude permeates these areas. Innovation is not just about technical knowledge: beliefs about disability, expectations of achievement, and a willingness to change teaching practices are also involved (Pérez Vera et al., 2024). Pérez Vera et al. (2024) demonstrate how teachers' perceptions are relevant to inclusion processes: if gamification is viewed as an activity intended only for students with high technological proficiency, then access will be limited; if it is interpreted as a flexible strategy, then supports can be designed for different student profiles. This gradual approach should not be viewed as a lowering of learning expectations, but rather as the construction of a progressive pathway toward the same level of academic rigor, which allows students with intellectual disabilities to experience successive achievements, sustaining their motivation throughout the process.

Training should include opportunities for reflection on these beliefs in addition to practical workshops. Reflective practice can be organized into short cycles of design, implementation, and adjustment. Before conducting the activity, the teacher knows which curricular objective must be achieved and what barriers will arise. During implementation, they observe students' understanding, participation, and need for assistance. Afterward, they analyze the evidence and adjust rules, time limits, supports, or feedback. This cycle prevents gamification from becoming stuck in a template; it also helps distinguish between content-related difficulty and difficulty caused by the game's design (for example, if several students fail because the instruction is ambiguous, increasing rewards will not solve the problem; the instruction must be redesigned).

Collaboration among teachers is what makes this possible. Inclusive gamification experiences require knowledge of special education, curriculum, technology, and assessment. Working together creates banks of accessible activities, shared criteria for evaluating platforms, and support protocols; it reduces dependence on individual initiatives that disappear when the teacher changes. An institutional policy on inclusive innovation should turn best practices into collective knowledge (which adjustments worked, for whom, and under what conditions).

The pedagogical use of digital resources requires competencies that go beyond the instrumental use of platforms or applications. Jácome Encalada and Sánchez Vera (2023) situate teachers' digital competence within a framework that includes activity design, assessment, the curricular integration of technologies, and professional development. From this perspective, gamification in inclusive contexts means that teachers can assess not only how engaging a tool is, but also its pedagogical relevance, accessibility, and adaptability to students' characteristics.

Institutional Conditions, Accessibility, and Equity

The incorporation of gamification into general basic education takes place under specific material conditions: unequal access to devices, connectivity, and support can prevent activities from continuing. Macías et al. (2020) discuss virtual environments as learning settings and platform management in the academic context; Castro Morales et al. (2025) address the influence of emerging technologies on virtual educational environments.

These discussions remind us that technological innovation must be planned with consideration for the institution's actual infrastructure and families' access possibilities. Equity does not mean offering everyone exactly the same activity. In a gamified environment, some students may need audio, pictograms accompanied by text, fewer stimuli, or different input devices. Others may need a different difficulty level or more opportunities for practice.

Adaptation does not lower academic standards if the learning objective remains the same; it simply changes the path to achieving it. This distinction must be made to avoid confusing inclusion with indiscriminate simplification. Technological resources must also be evaluated for accessibility. Before adopting a platform, consider readability, contrast, element size, navigation clarity, repeated instructions, timers, the amount of visual stimuli, and available devices. Activities that automatically penalize slowness disadvantage students who need more time to process information; public leaderboards can penalize those who progress at different paces.

The pedagogical decision is to enable/disable or replace features depending on the goal of inclusion. The literature on ScienceDirect provides useful evidence for extending this analysis beyond local studies. Conde and Rodríguez-Sedano (2024), in a review of learning analytics and students with intellectual or developmental disabilities, state that it is possible but requires adaptation because it can complement gamification since interaction data allow for the identification of patterns and the adjustment of supports; analytics, however, should be used with caution because digital records show behaviors within a platform but do not explain why a student responds in a certain way.

Another line of evidence comes from research on gamified tools for special educational needs. Anderle et al. (2025) examined the impact and acceptability of gamified tools on decoding and writing tasks among children with special educational needs: improvements and high acceptance were observed, but some measures were not statistically significant; larger samples and more robust designs are needed. Potential meets caution here, which is consistent with the position

advocated here: gamification can support learning, but this must be demonstrated in each context it should not be assumed simply because playful elements are used.

Sustainability is another institutional requirement. An isolated experience may provide temporary motivation, but it will have limited impact if not integrated into the curriculum. The institution must consider account maintenance, resource updates, data protection, device availability, and ongoing training, as well as non-digital alternatives when connectivity fails or a tool is unavailable to a student. Inclusion means that the learning objective can be achieved through more than one pathway.

Potential, Limitations, and Criteria for Practice

The body of reviewed literature allows us to see where the consensus lies: gamification can promote engagement and certain dimensions of learning, but the results depend on the quality of the design and facilitation. Prieto et al. (2021), Hong et al. (2024), and Derks et al. (2022) operate at different levels of analysis (motivation and performance, design personalization, or the effects of serious games on populations with disabilities), but they agree that we cannot view gamification as purely instrumental.

Gamification's most significant contribution lies not in points or badges, but in the ability to structure goals, feedback, progression, and engagement in a way that is easily understood. Tensions also arise. One is between standardization and personalization. Platforms generally allow for the rapid application of the same activity to the entire group, but inclusion requires adjustments (Hong et al., 2024). Personalization is a central line of research in digital gamification (Hong et al., 2024). For students with mild intellectual disabilities, this tension is resolved when the teacher maintains common goals but tailors the form of participation, complexity, supports, and pace. Equity is thus built through comparable opportunities for progress, not identical experiences.

A second tension lies between extrinsic motivation and meaningful learning. Rewards capture attention at first, but if they are all you have to motivate participation, then the effect can be fragile. The design should shift the focus from the reward toward mastery of the task, autonomy, and collaboration. In this transition, descriptive feedback is more educational than a binary signal of success or failure: the student needs to know what they did well, what they can improve, and what the next step is.

A third tension lies between autonomy and support. Students with mild intellectual disabilities may need scaffolding, but too much help can restrict decision-making. Frisch et al. (2025) show that the digital participation of students with intellectual disabilities requires support, but the pedagogical intent must be for such support to lead to progressively more independent participation; therefore, inclusive gamification must include gradual supports optional hints, examples, demonstrations, repetitions, etc. rather than an adult systematically solving the task.

A fourth tension lies between innovation and institutional feasibility. Ecuadorian studies on digital training and competence (Mena et al., 2024; Guevara, 2024) help situate the debate within the specific context of professional development: it is not enough to suggest innovative platforms if there are limitations in connectivity, time, or support. Sustainable innovation begins with what is available and with limited objectives. A simple, accessible, and evaluated activity can be pedagogically more valuable than a complex platform that the teacher cannot adapt.

Based on these convergences and tensions, six integrated decision criteria for practice are proposed: first, curricular relevance (each gamified element must address a learning objective); second, accessibility (barriers to understanding, interaction, and activity time must be reduced); third, personalization (challenges and supports must be adjustable); fourth, formative feedback (the system's or teacher's response must guide the next step); fifth, multimodal assessment (data from the platform must be corroborated with observation and performance on other tasks); sixth, sustainability (the strategy must function within the institution's resources and capabilities).

These criteria allow us to evaluate a tool before its use and review it after its use. The initial research question can be answered on two levels. At the learning level, gamification works when it organizes graded, understandable, and motivating experiences that allow for practice, feedback, and engagement with supports; at the teaching level, competence in designing, adopting, observing, and evaluating is also required (not just technological knowledge).

The link between these two levels is inseparable: the same tool can promote inclusion or create new barriers, depending on the decisions made regarding its use. The key contribution of this chapter is to argue that inclusive gamification should be judged not by how many game elements it contains, but by the engagement it fosters. It is not about how many badges a student earns, but whether they understand better, need less help, persevere in the face of error, collaborate with others, and apply what they have learned. This shift in criteria puts pedagogy back at the center, and innovation is no longer measured by the novelty of the resource. For teachers, this means programs that combine theory with practice: workshops should be based on real-world cases, redesign activities, analyze barriers, and discuss evidence of learning.

Training can include microcycles of implementation (designing an activity; applying it with a small group; collecting evidence; reviewing decisions; sharing results with colleagues). It links digital competence with inclusion and professional reflection, rather than focusing solely on training in software functions. The most recent evidence from Ecuador shows that gamification must be analyzed from the perspective of its pedagogical design (and not just from the use of technological resources). Sarango Lapo et al. (2026) evaluated a five-week gamified intervention with middle school students and found significant differences in favor of the experimental group. Rather than directly generalizing these results to students with mild intellectual disabilities, the study allows us to recognize that a planned and sustained intervention linked to curricular objectives provides greater stability than the occasional use of game-based activities.

Finally, the research agenda needs to be more precise: gamification must be distinguished from game-based learning and serious games; the elements used must be described in detail; adaptations for mild intellectual disabilities must be reported; and outcomes must be measured beyond satisfaction. Autonomy, transfer, adaptive skills, social participation, and the sustainability of effects should also be focal points of future research (Derks et al. 2022; Conde and Rodríguez Sedano 2024; Hong et al. 2024; Frisch et al. 20259; Anderle et al. 2025). The evidence from Derks et al. (2022), Conde and Rodríguez Sedano (2024), Hong et al. (2024), Frisch et al. (2025), and Anderle et al. (2025) is promising, but this remains a heterogeneous field where claims must be commensurate with the quality and scope of the studies.

Conclusions

Gamification can be a relevant pedagogical strategy for the learning of students with mild intellectual disabilities when designed based on principles of inclusion rather than the mere incorporation of technology. The review and discussion presented here show that game

elements can provide clear objectives, repeated practice, feedback, and gradual progression. These features are especially useful when adapted to each student's pace, comprehension, and engagement styles. However, the evidence does not support any claim that every gamified experience yields better results: the effects depend on the population, the design, the support provided, and the indicators evaluated.

The primary condition for gamification to contribute to educational equity is pedagogical personalization (difficulty, time, visual support, language, feedback, and mode of participation) so that what is intended to motivate does not become a new barrier. Accessibility must be considered from the outset, not as a subsequent adjustment. Progress must be assessed using a variety of evidence (digital records, teacher observations, and performance on authentic tasks).

Teacher training is the linchpin of this proposal. Teachers need digital skills, but they also need knowledge about disabilities, curriculum adaptation, assessment, accessibility, and diversity management. Technical training alone is insufficient if it does not develop the criteria needed to decide when to use a tool, how to modify it, and when to replace it. Professional competence lies in the ability to translate student data and responses into timely pedagogical decisions.

The burden of inclusion cannot fall solely on teachers: connectivity, devices, support, time for planning, training, and accessibility policies must be provided by institutions. The sustainability of gamification depends on successful experiences being documented, shared, and linked to the curriculum; innovation ceases to be an isolated initiative and becomes an institutional practice that can be evaluated and improved.

In response to the guiding question, gamification contributes to inclusive learning when it serves as a flexible framework for participation: it organizes achievable challenges; offers support; and makes progress visible while enabling learning from mistakes. To use it with students with mild intellectual disabilities, teachers need both digital competence and inclusive competence in the design process itself. The challenge for the future would be to produce more specific evidence (sufficiently rigorous descriptions of adaptations and outcomes) so that we can identify which elements work, for whom, and under what conditions. This agenda would shift our focus away from enthusiasm for technology toward more precise and well-founded ethical educational decisions.

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Textile Pigments and Sustainability: Challenges in the Fast Fashion Industry

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Introduction

The fast fashion industry has experienced exponential growth in recent decades, driven by accelerated production models, low costs, and a high turnover of collections. This approach, based on immediacy and planned obsolescence, has transformed the dynamics of textile consumption but has also intensified pressures on the environment. In particular, the widespread use of synthetic pigments and dyes in dyeing processes is one of the main sources of environmental impact in this sector (López, 2024). As Antunes (2022) points out, many of these pigments contain highly polluting chemicals, including heavy metals and persistent organic pollutants, which have significant adverse effects on ecosystems and the environment in which production activities take place.

One of the most critical problems associated with this industry is the improper discharge of wastewater from textile factories. It is estimated that a considerable proportion of these effluents does not receive adequate treatment before being discharged into rivers and seas, leading to the degradation of water quality and the disruption of aquatic ecosystems (García, 2021). In this context, textile pigments not only contribute to water pollution but also generate hazardous waste with cumulative effects on biodiversity and human health (Aparcana et al., 2024). , prolonged exposure to these compounds can result in negative impacts due to their toxicity and capacity for bioaccumulation in organisms, increasing risks for communities near areas of intensive production (Silva and Prestes, 2023).

At the societal level, this issue takes on particular significance due to its implications for vulnerable populations living near textile production centers. The lack of corporate social responsibility practices in some industrial contexts has contributed to the ongoing exposure of these communities to pollutants in the water and air, leading to health effects and a decline in quality of life (García, 2021). Likewise, limited environmental awareness among consumers hinders changes in consumption patterns, perpetuating the demand for fast-moving, low-cost products (Lofeudo, 2024).

From an environmental perspective, water sources are the systems most affected by the discharge of waste derived from synthetic pigments, which leads to biodiversity loss, disruption of ecological cycles, and a decline in water quality. Furthermore, the accumulation of these compounds in soils and water bodies hinders the natural regeneration processes of ecosystems and contributes to the intensification of the global environmental crisis (Lofeudo, 2024).

Economically, the textile industry faces growing sustainability challenges in a context where demand for more eco-friendly products is rising and environmental regulations are becoming stricter. In this regard, adopting sustainable alternatives not only addresses an environmental need but can also yield long-term economic benefits by providing a competitive advantage in a market transitioning toward more responsible production models.

Despite the growing body of research on sustainability in the textile sector, a gap persists in the specific analysis of the impact of pigments within the fast fashion model. Therefore, this study aims to help close this gap through a qualitative approach that integrates a bibliometric review, environmental assessment, and the formulation of mitigation strategies. To this end, publications from 2020 to 2025 were analyzed using VOSviewer software to identify research trends, and the environmental effects associated with the use of textile pigments were evaluated. Furthermore, recommendations were formulated based on international experiences, emerging technologies, and best practices in environmental management, with the aim of providing tools to facilitate decision-making in academia, industry, and the public policy sphere, all geared toward more sustainable textile production that is mindful of its impacts.

Results

In the first stage, a structured bibliometric search was conducted to gather scientific and academic information on the environmental impact generated by pigments used in the fast fashion industry. Google Scholar was used to identify terms in both Spanish and English to ensure international and multidisciplinary coverage of the topic.

The search was restricted to publications from 2020 through April 2025 to analyze current and relevant information. In this context, 100 documents primarily articles from scientific journals were selected, and VOSviewer software was used to visualize and analyze the collected information through maps showing relationships among authors, keywords, institutions, and the countries most active in research on the topic. This made it possible to identify predominant lines of research, such as the toxic effects of dyes, the most polluting textile production processes, and efforts toward sustainability in fast fashion.

Years: 2020–2025

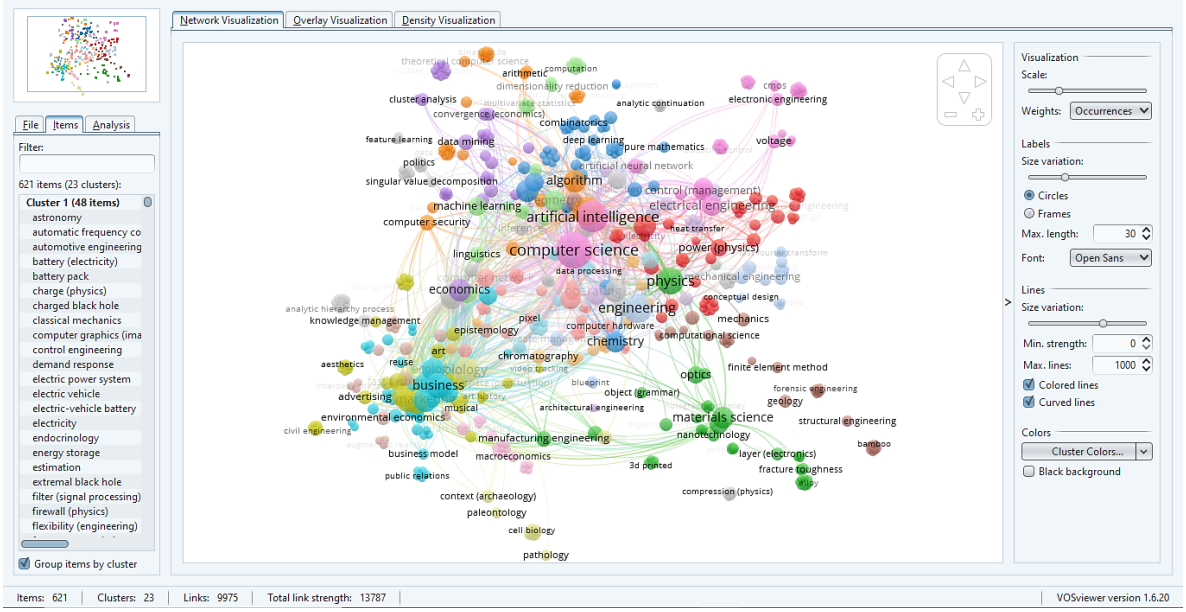
Spanish search query: (“Fast Fashion” OR “moda rápida”) AND (“textile dyes”) AND (“sustainable production”).

English search: (“Fast Fashion”) AND (textile dyes) AND (sustainable production).

Exclusion criteria for selecting the 100 documents:

- Documents that were not directly related to the use of textile dyes or pigments were excluded; even if they dealt with the fast fashion industry, they must have an associated environmental or economic impact.
- Studies published before 2020 were also excluded to ensure the information collected was up-to-date.
- Documents from non-scientific sources, such as blogs, opinion pieces, or press releases, were excluded.
- Duplicate documents were discarded, retaining one version of each.
- Documents whose full text was not available were excluded, as this prevented their in-depth reading and analysis.

Figure 1. VOSviewer interface and usage.



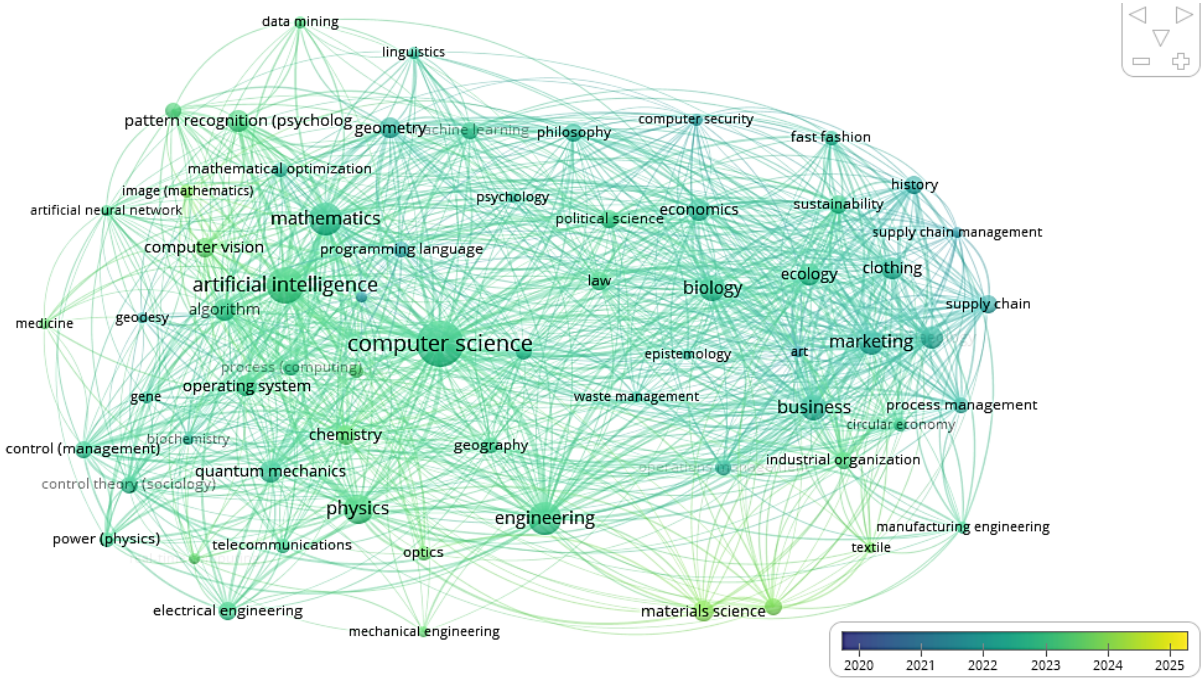
Note: Created by the authors using VOSviewer software, 2025.

The fast fashion industry has been widely identified as one of the most polluting industries globally, due to its mass production practices, intensive use of resources, and generation of waste (Manjarrez, 2024). One of the least recognized but highly polluting aspects of the industry is the use of textile pigments and dyes, which pose a major threat to the environment and public health. These compounds used to color clothing often contain toxic chemicals that, during the dyeing, washing, and finishing processes, are released into water and soil, causing a significant environmental impact (Vázquez, 2021).

Given the growing concern for sustainability in the textile industry, it is important to understand the scope of this problem from a scientific and evidence-based perspective. Therefore, this chapter presents a bibliometric search focused on identifying, analyzing, and organizing recent academic literature related to the impacts of pigments in the context of fast fashion.

Through the use of specialized bibliometric classification tools such as VOSviewer and the Google Scholar academic database, this study seeks to establish a solid framework that allows for the visualization of the main keywords or lines of research in 100 documents, along with the stakeholders, countries involved, and trends related to this issue, in order to support the technical discussion and propose environmentally responsible solutions.

Figure 2. Keywords/concepts with more than 5 occurrences.



Note: Created by the authors using VOSviewer software, 2025.

The bibliometric analysis conducted on 100 related documents which were filtered according to the aforementioned exclusion criteria allowed us to identify a set of keywords with more than five occurrences, as shown in the figure above, highlighting the predominant themes in the recent literature from 2021 to 2022. Among the recurring keywords are "computer science" with 76 occurrences, "artificial intelligence" with 49, and "mathematics" and "engineering" with 38 each. This reveals a strong focus on the use of digital technologies and computational methods applied to the study and optimization of industrial processes related to textile pigments, highlighting the interest in incorporating technological innovation into the search for sustainable solutions for the industry.

In addition, terms such as "business" (25), "marketing" (21), and "economics" (17) highlight the attention being paid to the economic and commercial aspects of fast fashion, particularly regarding the profitability of adopting sustainable practices and the market challenges this presents. On the other hand, the keywords "biology" (23), "ecology" (17), "physics" (20), and "sustainability" (15) confirm the interest in the environmental and biological effects of pigments, indicating that the literature also addresses in depth the ecological impact generated by the use of dyes in textile production.

The term "supply chain" also stands out with 12 occurrences, suggesting significant interest in understanding how the use of pigments influences supply, production, and distribution. Finally, the appearance of concepts such as "operating system," "quantum mechanics," and "history" though less frequent is associated with innovative or transdisciplinary approaches, whether from the perspective of process control, textile design, or the historical study of pigment use.

Taken together, these results demonstrate a multidisciplinary perspective on the phenomenon, integrating technological, environmental, economic, and social knowledge. The fast fashion

industry is being evaluated not only in terms of its environmental impact due to the use of pigments but also in terms of the potential for transformation through artificial intelligence, sustainability in the value chain, and the redesign of its production practices.

Additionally, the countries with the highest number of citations in the analyzed documents regarding the impact of pigments on the fast fashion industry were identified. The United States leads significantly in this regard, with a total of 382 citations spread across 16 documents, which highlights its leading role in the generation and dissemination of knowledge on sustainability and environmental practices in the textile industry. China follows, with 290 citations across 20 documents, reflecting its prominence both as a major producer in the fast fashion sector and in the field of research.

Australia ranks third with 186 citations in just 4 documents, highlighting the high quality and impact of its publications. Italy also exerts significant influence, with 203 citations across 7 documents, likely due to its tradition in the fashion industry and the growing focus on more sustainable practices. India, with 104 citations across 8 documents, demonstrates a growing interest in the environmental impacts of textile production, while also being one of the countries with a high volume of textile manufacturing.

In addition, the United Kingdom also ranks highly, with 101 citations across 6 papers, followed by Romania (76 citations), Hong Kong (74), and Taiwan (34), indicating active participation by European and Asian countries in the academic discussion on pigments and their relationship to sustainability in fashion. Canada, with 27 citations, and Japan, with 13, round out this group of countries whose scholarly output has exceeded two citations, demonstrating that interest in the environmental impacts of fast fashion is global and includes significant contributions from diverse geographic contexts.

Furthermore, an analysis of the 100 documents examined revealed that no author appears more than once, suggesting a wide diversity in related academic output. This dispersion of authorship indicates that the topic is addressed by multiple researchers from different institutions and regions.

With regard to the analysis of organizations with at least two published documents, there is significant institutional diversity in academic output related to pigments and their impact on the fast fashion industry. Thirteen institutions were identified as having contributed two or more publications, with the University of Southern California being the only one to have three documents and a high number of citations (80), suggesting greater research influence in this field. They are followed by prominent universities such as the University of Florence and Louisiana State University, with 86 and 76 citations, respectively, demonstrating a high impact despite having only two publications each. Institutions such as the Hong Kong Polytechnic University, Hainan University, and the Centre National de la Recherche Scientifique also have a significant presence in terms of citations, reflecting international interest in this topic from various academic perspectives.

Although most of these universities have low or no "Total Link Strength," indicating limited collaboration among them, their individual output contributes to a global and multidisciplinary perspective on the challenges posed by pigments in the context of fast fashion. This reinforces the need to promote cooperative networks among institutions to strengthen knowledge development in this field.

To conclude the bibliometric analysis, it is important to highlight that the study clearly identified the main trends, thematic approaches, and academic actors involved in scientific research on pigments and their impact on the fast fashion industry. The distribution of keywords revealed a strong presence of disciplines such as computer science, artificial intelligence, sustainability, and ecology, reflecting the interdisciplinary nature of the topic and its connection to technological, environmental, and social advancements. Likewise, the analysis by country highlighted the active participation of nations such as the United States, China, and Australia, whose contributions have been highly cited, demonstrating their research leadership in this area.

Although no duplicate authors were found suggesting a wide diversity of perspectives the organizations with the highest number of published papers and citations indicate the existence of key institutional hubs that are driving knowledge in this field.

These findings provide a solid foundation for future research, highlighting not only the most relevant sources and the most influential actors but also the gaps and opportunities for scientific collaboration that can still be explored. In this way, the bibliometric analysis fulfills the purpose of contextualizing the state of the art and strategically guides the next phases of the study, which will delve deeper into the environmental and social impacts of pigments in fast fashion and the development of more sustainable solutions.

Effects of Textile Pigments on Environmental Sustainability

Of the 100 documents initially compiled in the bibliometric search, 50 publications were selected as representative and relevant to the development of this second research objective. These documents made it possible to describe the implications of pigment use in the fast fashion industry, focusing on their relationship to the pollution generated by these dyes and the challenges associated with sustainability.

Through analysis of the information contained in these studies, it was possible to identify significant negative effects linked to textile dyeing and finishing processes, such as the release of toxic compounds into water bodies, high water consumption, the generation of hazardous waste, and the persistence of non-biodegradable synthetic dyes in the environment. These documents also provided evidence regarding the implementation of clean technologies across much of the sector and highlighted emerging efforts toward the adoption of sustainable practices.

Herrera (2021) conducted an experimental study at the University of Los Andes, evaluating the use of dyes derived from humic substances as a sustainable alternative to synthetic pigments. Through tests for colorfastness to washing, rubbing, and sun exposure, it was demonstrated that these natural pigments can offer similar performance in terms of color intensity and durability. In addition, an economic analysis was conducted that demonstrated their viability at the industrial level. It was concluded that this alternative reduces water and chemical pollution and can be economically competitive, representing a step forward toward a more responsible textile industry.

Flores and Gutiérrez (2021) conducted a survey of fashion design students to identify perceptions regarding sustainability in the textile industry. Although the study did not focus directly on the use of pigments, it addressed the importance of incorporating sustainable practices from the design stage onward, including the conscious selection of materials and less polluting processes such as natural dyes. The findings highlighted the need for strategies that foster a culture of

sustainability in fashion, indirectly aiming to reduce the use of synthetic pigments through academic training.

Pastrana and Almanza (2021), in their study published in "Jóvenes en la Ciencia," investigated the implementation of the circular economy in the fast fashion industry, highlighting the use of recycled fibers. This study demonstrated that textile recycling reduces the need for new dyeing processes, which indirectly decreases the use of polluting synthetic dyes. It was concluded that circularity strategies have a positive environmental impact, as they reduce waste and chemical use and promote sustainable practices throughout a garment's life cycle.

Vázquez (2021) analyzed the fast fashion production model and its impact on natural resources, identifying the intensive use of chemical dyes in the mass production of garments as one of the main problems. Through a critical analysis, it was shown that these pigments contribute significantly to water pollution and environmental degradation. The study concluded that, although the fast fashion model appears economically accessible, its environmental costs are very high; therefore, it is necessary to promote responsible consumption and reduce the use of synthetic compounds in textile processes.

De Churruca (2021) explored the reuse of textile scraps in Cotopaxi, Ecuador, using the patchwork technique as a strategy to reduce the production of new textiles. Although pigments were not addressed directly, the recycling approach implies a reduction in dyeing processes and, therefore, in the use of synthetic pigments. In this context, sustainable and vegan fashion is proposed as a viable alternative to minimize the sector's ecological footprint, while also reducing the toxic impact of industrial dyes.

Martínez (2022) examined the sustainability status of two textile companies in Colombia through an analysis of their production processes. It was found that water consumption and a lack of innovation in dyeing processes remain obstacles to responsible production. It was concluded that adopting strategies such as recycling and reducing the use of chemicals (including dyes and pigments) can increase sustainability by up to 47%, reaffirming the need for innovation to reduce the sector's environmental pollution.

Moncada et al. (2022) developed a circular economy-based proposal in the city of Cúcuta, in which they experimented with natural dyes derived from kitchen waste as an alternative to synthetic pigments. They applied artisanal techniques such as batik and manufactured sustainable textile products. The results demonstrated that it is feasible to generate ecological and aesthetic value from organic waste, which contributes to reducing pollutants in water bodies and promotes cleaner and more responsible production.

Arequipa (2022) conducted an experimental study in Ecuador to compare the effectiveness of biochar derived from organic waste with activated carbon in removing methyl red pigment. Although activated carbon was more efficient, it was found that chemical activation of the biochar would significantly improve its capacity. The study concluded that this research drives the development of sustainable solutions that mitigate the harmful effects of synthetic pigments on water bodies, especially in areas with high industrial impact.

Yánquez (2022) conducted an experimental study in Argentina on natural dyes applied to denim using dye plants such as chilca, shiran, and pomegranate. Variables such as colorfastness to washing, light, and rubbing were evaluated, demonstrating that natural pigments can be effective and less harmful. It was concluded that the use of these dyes reduces environmental

and human health risks, positioning them as a viable alternative to highly polluting industrial pigments.

Veiras (2022), in his analysis of sustainable supply chains, compared the Fast Fashion and Slow Fashion models, highlighting how design and traceability influence the sustainability of textile products. Although the approach was more systemic, it was emphasized that Fast Fashion conceals polluting practices such as the use of synthetic pigments without environmental oversight. The transition toward a "Slow Fashion" model, with traceability and the mindful use of materials, can reduce the environmental impact of dyeing and promote more responsible consumption.

Benavides (2022) conducted a qualitative study analyzing four sustainable fashion brands and Latin American designers, integrating five dimensions of sustainability: economic, social, environmental, cultural, and aesthetic. The study highlighted the search for eco-friendly materials that minimize environmental impact without sacrificing aesthetics or functionality. Although pigments were not directly addressed, the use of cleaner materials implies less reliance on polluting dyeing processes, and the study concludes that responsible design is a fundamental tool for reducing the environmental footprint of fast fashion.

Olano and Quintana (2022) proposed a "fashion truck" as a tool for raising environmental awareness in Lima. Through an analysis of statistical data, they demonstrated the high environmental impact of fast fashion: 10% of global CO_2 emissions, 20% of freshwater use, and the generation of microplastics. Although the focus was not directly on pigments, these data reflect how chemical processes including dyeing exacerbate pollution. It was concluded that the circular economy and sustainable design are key to mitigating environmental damage.

Trujillo (2022) analyzed data on the textile industry in Mexico, revealing that it consumes more than 30 million cubic meters of water and releases more than 20,000 metric tons of toxic substances into the environment, primarily due to the dyeing and finishing processes. The study used secondary sources to estimate the volume of waste and recycling, concluding that the low reuse rate (5%) exacerbates pollution. Urgent measures are proposed, such as replacing toxic pigments with natural or biodegradable dyes, as well as implementing sustainable dyeing technologies, such as digital printing or water -free dyeing. In addition, the study suggests improving wastewater treatment through advanced processes such as ozonation or biological filters, and adopting environmental certifications such as OEKO-TEX® or GOTS to ensure cleaner and more responsible textile production.

Andrade et al. (2022) conducted a comparative review between Colombia and China, using tools such as the Water Footprint Assessment Tool and ISO 14046 to analyze the water footprint of textile production. They found that fast fashion has doubled its production, creating a crisis in water resource management, exacerbated by the uncontrolled use of chemical dyes. The conclusion was that it is urgent to transform dyeing processes by adopting clean technologies, such as the use of natural dyes, dry or low-water-consumption dyeing techniques, and closed-loop liquid recirculation systems. These alternatives would reduce pressure on water resources and minimize the release of pollutants. In addition, the report proposes strengthening environmental regulations in Colombia by establishing stricter controls on the use of chemicals and promoting incentives for the implementation of sustainable practices.

García (2022) conducted an analysis of the impact of fast fashion in Lima based on bibliographic sources and exploratory interviews; this author addressed the problem of excessive garment production and their rapid disposal processes that include highly polluting dyeing stages. It was

concluded that, despite increased environmental awareness, the lack of sustainable practices requires a profound restructuring of the consumption and production model.

Juriti et al. (2022) conducted a study on the cultural implications of fast fashion from a sociological perspective in Brazil. In this context, impulsive consumption disguised as a personal decision is based on a marketing strategy that obscures polluting processes such as textile dyeing with toxic pigments. Although the study does not technically address the dyeing process, it concludes that exposing these practices is essential for promoting critical ecological awareness and transforming consumer behavior.

Betancourt et al. (2022) developed a clothing collection made from recycled PET as a solution to the impacts of fast fashion. They used design and prototyping to test textile materials derived from recycled bottles. This approach reduces the need for fibers dyed with toxic pigments, which in turn reduces the chemical burden on the environment. The conclusion was that integrating sustainable fabrics from the design stage can replace polluting processes and shift away from the logic of disposable production. Furthermore, it was found that the use of recycled PET not only reduces plastic waste but also offers functional properties that are competitive with those of conventional materials. This innovation represents a step toward a circular fashion model capable of influencing both the industry and consumer habits.

Lobo (2022) conducted a literature review on the impact of fast fashion and sustainable alternatives. Although the study was more theoretical, it highlighted how current industrial processes including textile dyeing and finishing are responsible for environmental degradation. It concluded that only through a structural change in the production and consumption model will it be possible to reduce the use of toxic pigments and move toward a truly sustainable system.

Graça (2022) applied an analysis based on Bauman's sociology of consumption (sociologist Zygmunt Bauman's critical view of contemporary society, which he terms "consumer society" or "liquid modernity") and the international legal framework. In this context, Bauman argues that people have shifted from being primarily producers to being, above all, consumers, and that their social value is measured by their capacity to consume (Graça, 2022). The study found that the success of fast fashion is based on practices such as labor exploitation and the indiscriminate use of polluting chemicals, including dyes. It concluded that environmental damage is not accidental but structural, and that a more rigorous enforcement of environmental laws is needed to protect both ecosystems and the human rights associated with textile production.

Villegas (2023) used the Toulouse Thinking methodology a pedagogical and creative approach developed by the Toulouse Lautrec School that combines strategic thinking, user-centered design, and social innovation to develop a digital platform focused on secondhand fashion. Recognizing the need to educate consumers about the environmental impacts of fast fashion including those generated by dyeing processes the strategy promotes the use and reuse of pre-dyed garments, thereby reducing the demand for new industrial processes. It is concluded that fostering the secondhand market can be a key strategy for reducing textile pollution.

Corrales and Agudelo (2023) conducted an experimental study to evaluate the efficiency of activated carbon derived from organic waste in removing dyes from textile wastewater. The study focused on treating effluents with high levels of synthetic pigments as a sustainable alternative to conventional treatment methods. The study concluded that this activated carbon is a viable solution for mitigating the environmental impact of dyeing, reducing the chemical

load discharged into water bodies and promoting a circular economy through the reuse of household waste.

Castro (2023) explored the environmental impact of dyeing denim with natural pigments as a response to polluting industrial dyeing processes. The study involved redesigning the business model with a focus on the circular economy and SDGs 12 and 8, incorporating sustainability into design, collaboration, and the supply chain. The experiment revealed that natural dyes significantly reduce chemical waste, and applying these models could reduce the 92 million metric tons of textile waste generated annually, marking an important step toward the industry's sustainable transition.

Sosa and Mercado (2023) launched the "Eco Deco" service in Lima, which reuses textile waste from fast fashion to manufacture decorative furniture. Based on a design proposal with a sustainable focus, this project seeks to transform waste from dyed garments into new functional products, thereby reducing their environmental impact. Although it does not directly address the dyeing process, it does challenge the throwaway mentality that allows dyed materials to end up polluting the environment. It was concluded that creative recycling extends the useful life of textile materials and raises public awareness about pollution in this industry.

Correa (2023) designed a new sustainable brand based on the recycling of textiles from the fast fashion industry. Through a "design for transition" approach, the project reuses pre-dyed materials, thereby preventing the generation of new chemical waste. Principles of responsible consumption and the circular economy were applied, with an emphasis on the creative transformation of textile waste into products with higher added value. The study concluded that this type of innovation helps reduce textile pollution by minimizing the use of synthetic pigments and promoting more sustainable and resilient business models.

Ibarra and Nishihara (2023) developed the "Cachineo" app in Lima, Peru, using a quantitative methodology based on surveys of young people between the ages of 18 and 35. The goal was to encourage the consumption of secondhand clothing and reduce the demand for new garments dyed with toxic compounds. The study revealed patterns of intensive consumption driven by fashion and brand, which fuel the fast fashion industry. It concluded that promoting digital reuse platforms can help mitigate the environmental impacts associated with textile production and dyeing processes, while fostering environmental awareness.

Llancari and Lobo (2023) compared the environmental impacts of fast fashion and slow fashion through a technical life-cycle analysis of nine garments. Using indicators such as GWP (global warming potential), PED (energy demand), and WC (water consumption), they concluded that fast fashion generates up to 51% more emissions and energy use, largely due to intensive processes such as industrial dyeing. Although slow fashion showed higher water use in some cases, its overall impacts were lower. The study highlights the need to radically transform dyeing and manufacturing methods to reduce the sector's environmental footprint.

Martínez and Ortega (2023) conducted an exploratory analysis of sustainable textile utilization strategies, based on international experiences such as the Barcelona Sustainable Fashion Association, which demonstrated how the widespread use of industrial dyes exacerbates the impact of fast fashion on ecosystems. The key lies in redesigning the value chain to integrate practices that minimize the use of chemicals and promote the reuse of already-dyed textiles, thereby reducing the generation of hazardous waste.

Da Silva et al. (2023) applied decision-support methods (AHP and TOPSIS) to evaluate the sustainable performance of fast fashion companies between 2018 and 2020. The study showed that, although some companies report "green" initiatives, many of them do not substantially modify their dyeing processes, which continue to rely on synthetic pigments with high toxicity. The conclusions emphasize that progress in sustainability is, to a large extent, superficial, and that it is imperative to integrate clean technologies into the most polluting stages such as textile dyeing and finishing to achieve structural change.

Martínez and Ortega (2023) delve deeper into the analysis of fast fashion as one of the main sources of textile waste and polluted water. Using an approach based on the circular economy and the SDGs, they proposed strategies focused on redesigning products, generating shared value, and adopting a sustainable production model. The conclusions highlight that the dyeing process is one of the most polluting stages in the textile cycle, and that replacing it with clean technologies along with promoting recycling could drastically reduce the industry's environmental impact.

Pallini (2023) explored how social media and influencers encourage mass consumption of fast fashion despite widespread awareness of its negative effects; based on this research, the author identified a gap between environmental awareness and purchasing behavior. Although the study did not focus directly on pigments, it concluded that the appeal of visually striking garments (many of which are produced using highly polluting dyes) perpetuates an unsustainable model and proposed that sustainable alternatives must be more appealing, both in design and in accessibility.

Fernández and Ramírez (2023) reinforced their line of research by proposing sustainable strategies centered on the circular economy and Sustainable Development Goals (SDGs) 8 and 12. With a focus on product redesign, multisectoral collaboration, and responsible supply chain models, the authors identified how these practices can significantly reduce the 92 million metric tons of waste generated by fast fashion each year. The main challenge was to move away from the linear consumption model that prevails in the textile industry and replace it with comprehensive waste management, recycling, and redesign.

Gregori and Maier (2023), writing in the journal *Veredas do Direito*, examined the fast fashion production model in Brazil from a critical environmental law perspective. Through a normative and sociological analysis, they found that the model promotes unsustainable and accelerated consumption of fashion goods, generating social and ecological impacts that violate the right to a healthy environment. They conclude that the current system must be structurally rethought, emphasizing the need for more rigorous public policies and a cultural transformation that curbs unbridled consumption and preserves natural resources.

Hernández et al. (2023) questioned the fast fashion textile industry's true commitment to Corporate Social Responsibility (CSR). Drawing on a theoretical framework and a historical analysis of the evolution of CSR, the authors demonstrated how companies have transitioned from philanthropic practices to corporate strategies, often motivated more by social pressures than by ethical conviction. The implications are clear: if companies do not take an active and consistent role in addressing environmental and labor challenges, sustainability initiatives will continue to be perceived as mere window dressing with no real impact.

Silva et al. (2023), from Brazil, developed the "ReVeste" app project at a technical school, designed to revitalize thrift stores through digital marketing. The approach involved using technological tools to promote conscious consumption and reposition the social value of reused

garments. The key finding was demonstrating how the digital environment can transform consumer perceptions toward sustainable alternatives, positioning circular fashion as a desirable option in contrast to the impulsive, disposable model of fast fashion.

Soto and Prieto (2023) addressed the lack of awareness regarding the effects of fast fashion. Their research revealed that mass consumption of clothing generates significant environmental impacts, such as carbon emissions, excessive use of petroleum-derived synthetic fibers, and excessive water consumption. Furthermore, they denounced the exploitation of labor in precarious and/or vulnerable conditions. It is concluded that there is an urgent need to strengthen environmental education and ethical consumption to address the devaluation of sustainability in the textile industry.

Marafon et al. (2023) documented in *Homa Publica* the problem of textile waste in Ghana, a country that has become a dumping ground for fashion waste from the Global North. Through a literature review, the authors denounced a form of environmental colonialism in which developed countries transfer their textile waste to vulnerable nations, violating their human and environmental rights. They conclude that fast fashion perpetuates ecological injustice on a global scale, and that breaking this cycle requires adopting responsible consumption models and demanding that companies assume greater international responsibility in line with the 2030 Agenda.

Fernández and Ramírez (2023) presented an innovative proposal for a "Fashion Truck" as a sustainable mobile solution to fast fashion. Applying the Design Thinking methodology, they conducted 11 virtual interviews, a survey with 90 participants, and two creative workshops to develop a traveling model for textile reuse. This would include the sale of recycled clothing in good condition, garment customization, and workshops for creating accessories. The implications of this initiative demonstrate that it is possible to combine sustainability, creativity, and technology to build a replicable model that raises awareness in communities and strengthens the circular economy through design.

Zamora (2024) explored an experimental proposal that replaces synthetic pigments with humic substances used in fertilizers, applied to cotton fabrics. The research methodology was based on chemical experimentation with validation of color and fabric durability. The main finding was that these compounds can offer a less toxic and biodegradable alternative to conventional industrial dyes. The proposal represents a promising solution for reducing the environmental impact of textile dyeing, although it still faces challenges in terms of industrial scalability and standardization.

Chaboya (2024), in his study from Mexico, offered a critical analysis of the current environmental impact of fast fashion. Through a quantitative review of environmental and consumption data, it was noted that the mass production of clothing does not take into account the toxicity of the materials used or their degradation. The study highlights the need to rethink the consumption and manufacturing model from a systemic and environmental perspective. The main finding was the disconnect between product design and its life cycle, leading to a proposal for a structural transformation of the sector ranging from environmental education to the implementation of regulations.

Aparcana et al. (2024) analyzed the impact of fast fashion in Lima, highlighting its negative effects on water, air, and soil, as well as the depletion of natural resources. The study proposes vegan fashion as an alternative, which avoids materials of animal origin and emphasizes ethics and sustainability throughout the entire production cycle. The author concludes that sustainability

should not be limited to the manufacturing process but should encompass design, marketing, and consumer habits. These implications call for rethinking the future of the textile industry from a comprehensive environmental perspective.

Camaño et al. (2024) explained how fast fashion has accelerated climate change by encouraging massive and excessive consumption of clothing, leading to environmental consequences such as water and air pollution, as well as social consequences such as labor exploitation. Through a critical analysis, the study emphasizes that both the industry and consumers must adopt responsible practices such as mindful consumption and a preference for sustainable materials to mitigate these negative impacts.

Izquierdo (2024) focused his analysis on the need for textile companies to adopt sustainable production models to reduce the environmental damage caused by fast fashion. The author highlighted the advantages of responsible practices, emphasizing their economic and environmental viability; as a key premise, he asserted that a paradigm shift toward a more ethical model is urgent and necessary to curb the environmental crisis generated by the fast fashion industry.

Rivera and Patiño (2024), through a comparative study of Spanish and Peruvian consumers, analyzed how fast fashion multinationals generate a high environmental impact, even though they are not perceived as harmful by consumers due to the use of greenwashing strategies. This research revealed a disconnect between the actual impact and public perception, with the fundamental challenge being the fight against misinformation and the demand for corporate transparency to prevent the normalization of unsustainable practices.

De Almeida et al. (2024) addressed the lack of transparency and accountability among fast fashion brands, arguing that sustainability is only possible with informed consumers and clear regulatory standards regarding waste disposal and the textile industry. The study, which was methodologically grounded in a theoretical-analytical review, proposed the implementation of traceability in the production chain and greater regulation, which would enable the transformation of the current model into a more ethical and sustainable one.

Lima et al. (2024) assessed perceptions of sustainability in fast fashion among college students in Brazil. Although students recognize the negative effects, purchasing decisions are still based on price, fashion trends, and social media influence. This study revealed a gap between awareness and action, noting that the real challenge lies in transforming knowledge into responsible consumption habits through critical education and accessible initiatives.

Zambrano and Yulexi (2024) developed a communication campaign at the Universidad Laica Eloy Alfaro de Manabí in Ecuador to raise awareness about responsible consumption in the textile industry. Their assessment revealed a low level of social understanding regarding the impact of fast fashion among students, despite their willingness to change their consumption habits. The authors concluded that strategic communication, especially on social media, is a powerful tool for promoting behavioral changes toward more sustainable fashion.

Verdeguer (2024) proposed the implementation of sustainable strategies in the textile industry based on the Sustainable Development Goals (SDGs) and circular economy practices. Through a technical and documentary analysis, it was concluded that these strategies can significantly contribute to reducing the 92 million metric tons of textile waste generated annually, reinforcing the need to change the model of clothing consumption and production.

Hernández et al. (2025), in ESI Preprints, explored how young people in the state of Hidalgo, Mexico, perceive the fast fashion model. Although they recognize its impact, the factors that motivate purchases remain price and fashion trends. The study identifies a conceptual confusion regarding sustainability, which limits the adoption of responsible behaviors; this, in turn, suggests that bridging the information gap through critical education on sustainable industrial practices is key to transforming environmental concern into concrete action.

Echevarría and Ramírez (2025) applied the TAM model to analyze how attitude, perceived usefulness, and perceived ease of use of technology influence the purchase intention of women in Lima, Peru. They found that, while digitization improves the consumer experience, it can also reinforce accelerated consumption. The challenge is to integrate technology that facilitates sustainable practices without replicating the destructive patterns of fast fashion.

Chugchilán and Rivera (2025), in the scientific journal on health and human development, concluded their analysis by highlighting the urgent need to transform the global textile production model. Through a critical review of environmental, labor, and social impacts, they proposed the search for sustainable alternatives that respect the planet's limits, such as the use of biodegradable materials and the reengineering of production processes to achieve greater sustainability. The study concludes that a systemic approach to the industry, aligned with environmental ethics and social justice, is essential.

Consequently, based on the 50 documents reviewed, it is emphasized that fast fashion has been identified as one of the main contributors to the current environmental crisis in the textile industry, due to its model based on accelerated production, mass consumption, and the planned obsolescence of garments. Various studies highlight that this production model generates approximately 92 million metric tons of textile waste per year (Castro, 2023; Verdeguer, 2024; Martínez and Ortega, 2023), consumes more than 20% of the planet's available freshwater (Andrade et al., 2022), and accounts for 10% of global greenhouse gas emissions (Olano and Quintana, 2022). Furthermore, this consumption pattern has turned countries in the Global South, such as Ghana, into textile dumping grounds for the Global North, representing a clear environmental injustice (Marafon et al., 2023). The environmental implications of this model call for an urgent transformation of the production and consumption system toward one based on the principles of the circular economy, sustainability, and social responsibility (Corrales and Agudelo, 2023; Chugchilán & Rivera, 2025). The social consequences of fast fashion are also alarming. It has been widely documented that this model perpetuates conditions of labor exploitation, particularly in developing countries, where millions of workers (including women and children) face grueling workdays, low wages, and precarious working conditions (Olano and Quintana, 2022; Soto and Prieto, 2023). Added to this is the growing devaluation of labor and the normalization of labor rights violations (de Almeida Verdelli et al., 2024; Hernández et al., 2025). Although some brands have adopted corporate social responsibility rhetoric (Hernández et al., 2023), various studies question the authenticity of these actions, pointing out that many are used as greenwashing strategies that conceal unethical practices (Rivera and Patiño, 2024; Camaño et al., 2024). Therefore, the social implications call not only for greater regulation but also for more informed and critical consumers who can demand transparency and traceability throughout the production chain. Research also reveals a profound disconnect between consumers' environmental awareness and their actual purchasing habits. Although many people recognize the negative effects of fast fashion, their behavior continues to be guided by factors such as price, fashion trends, accessibility, and the influence of social media (Ibarra et al., 2023; Hernández et al., 2025; Lima et al., 2024). This pattern of impulsive consumption, disguised as

personal choice, has been reinforced by customer loyalty strategies based on the creation of artificial needs (Juriti et al., 2022). The cultural and psychological implications of this phenomenon show that the shift toward sustainable fashion must focus not only on product redesign but also on a change in mindset and consumer education (Zambrano and Yulexi, 2024; Pallini, 2023; Gregori and Maier, 2023). In this regard, the fashion of the future must be ethical, conscious, and sustainable, both in how it is produced and how it is consumed. In summary, in addition to the identified implications, the negative effects of textile pigments compromise environmental health and pose risks to human health, reduce the availability of drinking water, and increase the fashion sector's ecological footprint. There is an urgent need to adopt clean technologies, replace synthetic pigments with natural or functional alternatives, and implement comprehensive environmental management strategies throughout the life cycle of garments.

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Negotiation Skills Among Informal Street Vendors in Santander

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Introduction

Informal trade is a socioeconomic phenomenon associated with rising unemployment rates and structural limitations in the formal labor market (Botero and Herrera, 2008). This reality is evident in municipalities such as Piedecuesta, where informal vendors are concentrated in public spaces like the main park, "La Libertad," facing conditions that restrict their growth, including low educational attainment, limited mastery of sales techniques, and job instability.

Furthermore, it should be noted that unfair competition and the absence of regulation are factors that exacerbate the vulnerability of these economic actors (UNAB, 2020). In this context, negotiation skills take on a central role, as they become the primary resource for attracting customers, generating income, and sustaining their commercial activity, emerging not only as a necessity but also as an opportunity to strengthen their competitiveness and participation in the local economy.

From this perspective, negotiation is understood as a process aimed at achieving mutual benefits, in which the parties exchange interests, proposals, and expectations to reach satisfactory agreements; it is also a communicative process that seeks fair consensus through dialogue and interaction among the involved parties. In this sense, negotiation integrates both technical and relational elements, emerging as a combination of science and art that allows the parties to achieve better results through collaboration rather than confrontation (Fisher, Ury, and Patton, 2011). In this regard, the Harvard negotiation approach highlights key components such as alternatives, interests, options, criteria of legitimacy, compromise, communication, leadership, and relationships, which structure the negotiation process and enable the creation of sustainable and balanced solutions (Tobón, 2017).

In the informal trade sector, these skills are developed empirically, drawing on the seller's experience, charisma, and interpersonal skills, as sellers rely heavily on their ability to persuade and build rapport with customers (Marrero and Ortiz, 2018). However, the lack of training in negotiation limits their ability to manage prices, payment terms, and commercial agreements, placing them at a disadvantage compared to more structured markets (Pastrana, 2023). In this regard, strengthening these competencies not only has a positive impact on individual income but also contributes to local economic development by promoting more efficient, sustainable, and customer-oriented commercial relationships.

Consequently, the purpose of this study is to analyze the negotiation skills of informal vendors in Piedecuesta, in order to understand how they cope with the adversities inherent to their context and how they can improve their market position. It also seeks to generate knowledge that will enable the design of training and support strategies aimed at strengthening these skills,

thereby fostering the creation of more solid commercial relationships and access to better business opportunities.

Sociodemographic Analysis

The questionnaire provided a profile of the informal vendors, revealing a slight predominance of women, a wide range of ages, and a low level of education, with a predominance of primary school education and incomplete schooling. Commercial activity is concentrated primarily in clothing, accessories, food, and beverages. Notably, most vendors own their stalls, do not pay for the use of public space, and have been in the business for several years a reflection of the consolidation of informality as a source of livelihood. Economically speaking, the vast majority depend exclusively on this activity, with incomes generally ranging from half to one minimum wage, though in many cases these are insufficient to cover basic needs. Despite this, vendors perceive their sales techniques as effective, demonstrating empirical learning; however, they exhibit weaknesses in the implementation of formal business strategies, with limited use of positioning tools and limited adoption of marketing practices.

Negotiation Stages: Before

Regarding preparation prior to negotiation, it is evident that most informal vendors adopt a strategic approach when analyzing their strengths and weaknesses, as 91.7% and 1.7% report doing so regularly and always, respectively, which allows them to identify opportunities for improvement and enhance their capabilities for more effective sales management; however, a minority (5% and 1.7%) performs this exercise only occasionally or rarely, reflecting a lesser focus on planning. This finding aligns with the arguments put forth by David (2017), who maintain that the analysis of internal factors, such as strengths and weaknesses, is fundamental to the formulation of effective strategies and the improvement of organizational performance.

Regarding customer knowledge, it is evident that informal vendors do not place significant emphasis on understanding their customers, as 60% indicate that they analyze their customers' interests, strengths, and weaknesses only occasionally, and 3.3% do so rarely, while only 36.7% perform this exercise regularly to improve their service. This result reflects a limitation in strategic customer orientation, an aspect that contrasts with the findings of Checasaca-Julca et al. (2022), who emphasize that, given increasing competition, it is essential to understand the customer's profile and needs in order to design more effective value propositions, strengthen business relationships, and optimize negotiation processes.

Regarding the preparation of offer options, it is evident that a significant proportion of informal vendors engage in advance planning, as 6.7% and 58.3% report doing so always and usually, respectively, which allows them to anticipate customer needs and generate competitive advantages; however, 35% do so only occasionally, reflecting a lesser focus on generating strategic alternatives. This finding aligns with the arguments put forth by Suárez (2021), who maintains that, in contexts of greater market demands, it is essential to offer diverse options that meet customer needs, enabling organizations to remain competitive.

Regarding the anticipation of customer proposals, it is observed that a significant proportion of informal vendors incorporate this practice into their preparation, as 15% state they always do so and 40% do so regularly, which allows them to structure more attractive responses aligned with buyer expectations; however, 45% do so only occasionally, indicating a limited willingness to

systematically analyze potential customer offers. This behavior aligns with the findings of Peresson (2007), who emphasizes that anticipating customer requirements is essential for designing proactive value propositions and improving service quality.

Regarding the use of information from previous transactions, a variety of approaches is evident among informal sellers, as 1.7% and 58.3% report using this resource always and usually, respectively, as a basis for identifying successful practices and reducing uncertainty in negotiations; however, 38.3% use it only sometimes and 1.7% rarely, as they consider each negotiation to be unique. This behavior aligns with the findings of Wamba et al. (2020), who note that leveraging data and information improves decision-making, enables the anticipation of scenarios, and strengthens competitiveness in dynamic environments.

Regarding the analysis of the balance of power in negotiations, a relatively balanced perception is evident among informal vendors, as 53.3% indicate that they assess this balance only occasionally and 3.3% rarely, which may limit the achievement of equitable agreements, while 41.7% do so regularly and 1.7% always, fostering more collaborative interactions. This finding aligns with the arguments put forth by Fisher, Ury, and Patton (2011), who note that the appropriate use of power in negotiation based on objective criteria and collaborative relationships facilitates the achievement of balanced agreements, whereas its inappropriate use can negatively affect the relationship between the parties.

Regarding the identification of competitive advantages, there is evidence of a strong orientation among informal vendors toward analyzing their competitive environment, as 5% state they always do so and 55% usually do so, reflecting their interest in positioning themselves in the market through differentiating strategies; however, 36.7% do so only sometimes and 3.3% rarely, indicating some inconsistency in this practice. This finding aligns with the arguments put forth by Vidal (2022), who emphasizes that generating competitive advantages is fundamental to business growth and sustainability, as it enables the implementation of strategic actions that strengthen a business's position against the competition.

Regarding the definition of concessions, it is evident that most informal vendors adopt a flexible stance by planning in advance what they are willing to concede, as 53.3% do so regularly and 3.3% always do so, recognizing its importance in reaching satisfactory agreements; however, 41.7% do so only sometimes, and 1.7% rarely, arguing that they tend to maintain firm positions during negotiations. This behavior is consistent with the findings of Peñafort et al. (2020), who note that effective interaction with customers and proper management of business relationships foster value creation, strengthen trust, and help establish sustainable bonds in exchange processes.

Regarding the definition of the starting point in negotiations, it is observed that a significant proportion of informal sellers establish their proposal in advance, as 1.7% always do so and 51.7% usually do so, which allows them to maintain control and balance during the process; however, 46.7% do so only occasionally, preferring to first listen to the customer's offers before stating their position. This finding aligns with the observations of Mata (2021), who notes that a well-defined starting point is key to guiding negotiation strategy and managing the other party's expectations more effectively.

Regarding the determination of the best alternative negotiated agreement, it is evident that most informal sellers prioritize identifying favorable options, as 5% and 58.3% report doing so always and usually, respectively, which allows them to make more strategic decisions in the event that an agreement cannot be reached; however, 33.3% do so sometimes and 3.3% rarely,

limiting the use of this approach. This finding aligns with the observations of Verdeguer (2020), who highlights that the MAAN method allows for the identification of external alternatives that strengthen decision-making capacity, thereby preventing the acceptance of less beneficial agreements.

Negotiation Stages: During

Regarding the ability to adapt during negotiations, it is evident that a significant proportion of informal vendors show a willingness to adjust to new alternatives, as 53.3% do so regularly and 1.7% always do so, facilitating mutually beneficial agreements; however, 41.7% do so only sometimes, and 3.3% rarely, reflecting limitations in their openness to new positions. This result aligns with the findings of Mora (2018), who emphasizes that flexibility and adaptability are fundamental in negotiation, as they allow for responding to changes in the environment and generating strategic advantages.

Regarding the assessment of customer needs, informal vendors demonstrate a predominantly proactive approach, as 60% state that they usually ask questions to better understand their customers and 1.7% always do so, which helps create satisfying shopping experiences; however, 36.7% do so only occasionally, and 1.7% rarely, citing customers' limited willingness to interact. This finding aligns with the observations of Checasaca-Julca et al. (2022), who emphasize that the customer has become a central figure in business management; therefore, understanding their needs is key to strengthening relationships, building loyalty, and improving business results.

Regarding emotional management, there is evidence of a high level of self-control among informal vendors, as 71.7% state that they always regulate their emotions and 13.3% do so regularly, maintaining a calm demeanor during negotiations; however, 15% acknowledge occasional difficulties in maintaining this control in certain situations. This finding aligns with the observations of Fernández (2012), who notes that effective emotional management is key in negotiation, as it prevents deviations from objectives, protects the business relationship, and provides advantages by allowing one to anticipate the other party's behaviors and intentions.

Regarding the expression of emotions, a moderate trend is evident among informal vendors: 43.3% habitually express their feelings when defending their positions, while 53.3% do so only sometimes and 3.3% rarely, suggesting that they do not always feel they are in a safe environment to express their emotions. This behavior aligns with the findings of Fernández (2012), who notes that emotions can be even more decisive than words in negotiation, especially in situations of disagreement; therefore, their appropriate expression and management directly influence the success or failure of the negotiation process.

Regarding the identification of deceptive tactics, the data show that informal vendors demonstrate a significant ability to recognize manipulative actions during negotiations, as 6.7% and 55% report doing so always and usually, respectively, while 38.3% do so sometimes, reflecting a high level of intuition in this regard. This finding aligns with the observations of Salcedo (2021), who notes that the use of hostile or deceptive strategies can generate mistrust and tension and negatively affect negotiation outcomes, thereby damaging commercial relationships between the parties.

Regarding empathy toward the customer, there is evidence of a strong orientation among informal sellers toward understanding their needs, as 11.7% and 70% report doing so always and usually, respectively, which fosters rapport and flexibility in their positions; however, 16.7% do

so sometimes and 1.7% rarely, indicating certain limitations in this regard. This finding aligns with the observations of Vidal (2022), who emphasizes the importance of placing the customer at the center of the strategy by offering proposals tailored to their needs to improve the shopping experience and competitiveness.

Regarding the handling of disputes during negotiations, there is a clear majority tendency to focus on resolving the problem rather than on personal confrontation, as 3.3% and 55% report doing so always and usually, respectively, while 36.7% do so sometimes; however, a minority (1.7% and 3.3%) prioritizes defending their individual positions, which can hinder the reaching of agreements and strain the relationship with the customer. This behavior aligns with the findings of Ramírez et al. (2017), who emphasize that focusing negotiations on interests and needs, rather than on positions, fosters the creation of mutually beneficial solutions.

Regarding the use of pauses or breaks in negotiations, it is evident that a majority of informal vendors recognize their usefulness as a conflict-management strategy, as 61.7% use them regularly to reduce tensions and facilitate more balanced agreements; however, 25% and 11.7% use them occasionally and rarely, respectively, because they believe they might benefit the other party, while 1.7% never resort to this practice. This finding aligns with the observations of Salcedo (2021), who notes that negotiations can become hostile and nonlinear; therefore, the proper use of pauses helps prevent deadlocks and improves the quality of the agreements reached.

Negotiation Moments: After

Regarding the use of past experiences, it is evident that informal vendors rely heavily on this resource to guide their negotiations: 10% always do so, 68.3% usually do so, and 21.7% do so occasionally. This allows them to capitalize on previous lessons, avoid mistakes, and strengthen their sales strategies. This finding aligns with the observations of García and Ramírez (2023), who emphasize that analyzing past negotiations helps optimize decision-making, improve operational efficiency, and strengthen competitiveness.

Regarding the follow-up on agreements, a predominantly proactive approach is evident among informal salespeople, as 8.3% state they always do so and 88.3% usually do so, which helps control the negotiation process and build customer loyalty; however, 3.3% only do so occasionally, considering this process unnecessary once the sale is complete. This finding aligns with the views of Morgan and Hunt (1994), who note that building relationships based on trust and commitment is essential for strengthening customer loyalty, improving customer satisfaction, and promoting the sustainability of business relationships.

Observation Criteria

The results derived from the observation guide show that informal vendors perform well in operational aspects and customer interaction. In particular, 76.6% of the stalls maintain excellent conditions of order and cleanliness, and 98.3% offer adequate access for consumers, which facilitates the shopping experience. Similarly, high-quality customer service stands out, with 95% of vendors providing prompt service and 80% engaging in interactions characterized by friendliness and courtesy. However, a limitation was identified in the security conditions of the surroundings, which were rated as "fair" across the board, suggesting that external factors may influence perceptions of safety in the commercial space.

Furthermore, the results reveal weaknesses in the strategic components of the commercial environment, particularly in advertising, promotion, and services. 58.3% of vendors have issues with the visibility of their stalls, which reduces their appeal, although product presentation is mostly adequate. In terms of promotion, while prices are competitive (85% rated "very good"), 56.7% do not offer sales or commercial incentives, limiting their market positioning. Likewise, although product quality is rated as very good by 96.7% of respondents, there are limitations in payment methods, with 53.3% reporting average conditions due to a lack of diversity in options, which may affect the efficiency of closing sales.

In terms of inferential statistics, the results show that gender is not a determining factor in most negotiation skills, given that homogeneity prevails in the results ($p > 0.05$); however, statistically significant differences are identified in specific variables such as planning concessions (V8), empathy (V16), and the use of prior experience (V19), suggesting specific variations between men and women. Similarly, with regard to age, a general trend toward homogeneity persists in the skills analyzed, with the exception of the balance of power (V6), where significant differences are evident ($p \leq 0.05$), indicating that this aspect varies by age group.

Furthermore, educational level influences certain strategic skills, revealing significant differences in the analysis of strengths and weaknesses (V1), the use of prior information (V5), problem-focused thinking (V17), and learning from experience (V19), reflecting the influence of education on the structuring of the negotiation process. In addition, variables such as business ownership and length of time in the informal sector show differences in skills such as power balance, defining the MAAN, empathy, and following through on agreements, while factors such as the type of product offered and marketing strategies do not show significant differences, indicating homogeneous behaviors among vendors.

Conclusions

The negotiation skills of Piedecuesta's informal vendors are characterized by a primarily empirical development, grounded in the experience accumulated through the day-to-day practice of their commercial activities. Adaptability, empathy, emotional control, and customer focus have emerged as strengths that enable them to interact effectively in environments marked by high uncertainty and competition. Constant practice fosters the development of functional capabilities that ensure the continuity of their income and the sustainability of their businesses. The lack of a technical framework for these skills limits their strategic scope and reduces the potential to optimize negotiation outcomes. Decision-making is based more on intuition than on the systematic analysis of environmental variables. The lack of formal planning restricts the ability to capitalize on business opportunities. Strengthening these competencies requires integrating theoretical knowledge with practical experience. The shift toward more structured models will improve negotiating effectiveness.

The business practices of informal vendors reveal weaknesses in the structuring of market- and customer-oriented strategies. Limited analysis of consumer needs restricts the development of differentiated value propositions. The limited implementation of advertising and promotional strategies reduces product visibility in a competitive environment. The lack of diversification in payment methods affects the efficiency of closing commercial transactions. The absence of marketing tools limits business positioning and growth. Structural conditions, such as low educational attainment, influence the adoption of informal practices. The sector's competitiveness is affected by a lack of innovation in sales processes. Strengthening commercial

capabilities is necessary to improve economic performance. The incorporation of formal strategies will help optimize customer relationships and increase revenue.

Sociodemographic factors influence the varying development of negotiation skills among informal vendors. Educational level affects analytical ability and the ability to structure more complex strategies. Experience in the field fosters empirical learning and the consolidation of practical skills. Business ownership and economic conditions determine the degree of autonomy in commercial decision-making. The heterogeneity of the results highlights the need for differentiated interventions based on the characteristics of the vendors. The existence of significant differences in specific variables demonstrates that skills do not develop uniformly. Strengthening these competencies has direct implications for local economic development. Improvements in negotiation processes contribute to more sustainable business relationships. The implementation of training programs will increase the competitiveness and quality of the informal sector.

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Policy Alignment and Fulfillment of Campaign Promises in a Non-Party System: Exploratory Evidence from Peru, 2011–2026

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Introduction

Electoral accountability the correspondence between what parties promise and how they govern is one of the central issues in contemporary democratic theory (Royed, 1996; Thomson et al., 2017). Comparative literature has documented fulfillment rates exceeding 60% in consolidated parliamentary democracies (Naurin, 2011; Artés, 2013; Duval & Pétry, 2019) and identified its main determinants: legislative majorities, coordination within the governing coalition, and the technical capacity of the state apparatus. However, this body of empirical evidence rests almost entirely on European cases featuring programmatic parties, governments that serve full terms, and predictable planning budgets. The question of what happens when these conditions are simultaneously absent has not received a systematic empirical answer.

Peru between 2011 and 2026 represents this scenario in its most extreme form. Levitsky (2018) describes it as the most advanced case in Latin America of the institutionalization of non-party politics. In fifteen years, the country had nine heads of the executive branch, several of whom were removed from office before completing their terms. Mainwaring (1993) warned that the combination of presidentialism and extreme multipartyism is the most challenging for democratic stability.

What analytically distinguishes Peru is the coexistence of this political instability with an institutional planning system that continued to operate. SINAPLAN, created by Legislative Decree No. 1088 (2008), produced long-term planning instruments that were updated regardless of changes in government. The degree of alignment between campaign promises and these instruments had not been systematically measured.

This empirical gap serves as the starting point for this article. It does not aim to apply the Comparative Party Pledge Group (CPPG) framework to the Peruvian case. Instead, it introduces the Normative Alignment Index (IAN), a tool specifically designed to measure the consistency between electoral commitments and the SINAPLAN instruments in effect at the beginning of each term of office; it differs conceptually from the CPPG because, in a system without institutionalized parties, the electoral mandate is weak or nonexistent (Levitsky, 2018).

Institutional Determinants

The research question identifies four institutional factors that mediate the relationship between the IAN and observed compliance: the stability of the executive branch, measured as the number of incumbents per term divided by the duration of the term in years; the composition of Congress, measured by the effective number of parliamentary parties (Laakso & Taagepera, 1979) per legislative session; the technical capacity of CEPLAN, approximated by the number of SINAPLAN instruments updated within the established regulatory deadlines and by its executed budget; and sectoral regulatory density, measured as the number of sectoral national policies in force and updated at the beginning of each term. Since N = 3 at the period level precludes a regression analysis with sufficient statistical power, the relationship between these determinants and the IAN is examined through a matched-pairs comparison, contrasting the four periods two by two based on their differences in each determinant, rather than through a comparative qualitative analysis of fuzzy sets a technically viable alternative (Royed, 1996), but which requires a calibration of sets that exceeds the space available in an article and is left as a topic for future research.

Compliance Variable: Effective Compliance Index (ECI)

The IAN measures ex ante alignment at the start of the term; the design is complemented by an ex post measurement of compliance with the commitments that each government actually made. The unit of analysis for this second variable is the commitments coded as matching (level 2 of the IAN) for the party or candidate that was elected in each term Ollanta Humala (2011–2016), Pedro Pablo Kuczynski and his successors (2016–2021), Pedro Castillo and his successors (2021–2026). Each commitment is coded as fulfilled, partially fulfilled, unfulfilled, or inapplicable due to clearly identifiable exogenous causes a necessary adjustment given that the very diagnosis of institutional instability that motivates this article documents nine heads of the executive branch in fifteen years, several of whom were removed from office before being able to implement their own agenda following the scale used by Royed (1996) and Thomson et al. (2017).

The sources for this coding are CEPLAN's Annual Reports and its monitoring reports on the National Strategic Development Plan, sector-specific regulations enacted during each term of office, audit reports from the Comptroller General of the Republic when publicly available, and public policy monitoring reports from independent agencies as a secondary source of verification. The Effective Compliance Index (ICE) is calculated as the normalized average of matching commitments coded as fulfilled (value 1), partially fulfilled (value 0.5), or unfulfilled (value 0), excluding inapplicable cases from the calculation. The comparison between the IAN and the ICE for each period is the central finding that supports the article's argument: on its own, the IAN documents discursive alignment; only when combined with the ICE can one properly speak of compliance.

Presidential Vacancies and Attribution of Compliance

A specific validity issue with this design is the high level of presidential instability that characterized two of the four periods analyzed. While the administration of Ollanta Humala (2011–2016) completed its constitutional term without interruption, the periods 2016– 2021, and 2021–2026 were marked by successive presidential vacancies: the administration nominally attributed to Peruanos por el Kambio (2016–2021) was led successively by Pedro Pablo Kuczynski

(July 2016–March 2018, until his resignation), Martín Vizcarra (Mar. 2018–Nov. 2020, until his removal from office), Manuel Merino (5 days, Nov. 2020), and Francisco Sagasti (Nov. 2020–Jul. 2021); and the government nominally attributed to Perú Libre (2021–2026) was led successively by Pedro Castillo (July 2021–Dec. 2022, until his removal), Dina Boluarte (Dec. 2022–Oct. 2025, until her removal by Congress, having formally severed her affiliation with Perú Libre shortly after taking office), José Jerí (Oct. 2025–Feb. 2026, as acting president of Congress), and José María Balcázar (since Feb. 2026).

This instability raises a question of attribution that the original design of the ICE did not explicitly resolve: when a commitment in a party's governing platform is fulfilled (or not fulfilled) years after that party left office, should the outcome be attributed to the party that made the campaign promise, to the government that actually carried out (or failed to carry out) the action, or to neither? The analysis has revealed the strongest example of this case with Peruanos por el Kambio (2016), centered on Peru's accession to the OECD: during the terms of Kuczynski, Vizcarra, Merino, or Sagasti, there was no progress toward formal accession. Only during the administration of Pedro Castillo (Perú Libre) a party ideologically opposed to Peruanos por el Kambio was the formal process initiated in 2021–2022.

The full implementation of the Effective Compliance Index for the three constitutional terms for which it was possible to complete the ECI verification (fifty-four out of fifty-four verified commitments) shows that expressing policy alignment in the government's plan does not guarantee compliance. In this case, eight of fifty-four commitments were fully fulfilled, twenty-one were partially fulfilled, and twenty-five were not fulfilled. The Gana Perú and Peruanos por el Kambio-Vizcarra-Merino-Sagasti administrations, despite differences in the stability of the presidency, had the same level of compliance (0.375 and 0.379, respectively), while the Perú Libre administration, which had the shortest and most turbulent presidency of the three, failed to fulfill any of the verified commitments. This evidence shows that the perceived gaps in Peru's strategic planning system align with the arguments presented in this study: a dual gap between what parties promise and what the electorate rewards, and a gap between what governments promise and what they deliver.

The comparative analysis of results is limited to three presidential terms with comparable multiparty coding: 2011–2016, 2016–2021, and 2021–2026. The 2026–2031 period is reported solely as a prospective ex ante baseline, since no term has elapsed and it does not allow for the calculation of the Effective Compliance Index.

Policy Alignment by Period

Unlike the 2016–2021 and 2021–2026 periods, where the percentage of alignment commitments rated "High" on the IAN scale is reported, the primary source for 2011–2016 does not distinguish between levels of alignment and only allows for identifying the specificity of each commitment according to the CPPG protocol (Specific / Vague / Rhetorical); therefore, for this period, the percentage of commitments coded as "Specific" verifiable by target, deadline, or explicit implementation mechanism is reported as the closest available indicator of programmatic specificity, a limitation already noted in the section "Documentary Sources and Instrument Asymmetry." During the 2011–2016 period, out of eleven coded political organizations, the winning party (Gana Perú) had 75.0% of its commitments coded as "Specific," ranking seventh out of eleven parties. The highest levels of specificity were recorded by Alianza por el Gran Cambio and Alianza Solidaridad Nacional (100.0% each), followed by Perú Posible (87.5%) and

a group of three parties with 83.3% (Adelante, Partido Descentralista Fuerza Social, and Justicia, Tecnología, Ecología).

During the 2016–2021 period, among the five parties that accounted for 92.5% of the valid vote, the winning party (Peruanos por el Kambio) achieved 78.8% of commitments with a "High" alignment level, ranking second out of five. Acción Popular led the distribution (83.3%), followed by Peruanos por el Kambio, Alianza Popular (73.3%), and a tie between Frente Amplio and Fuerza Popular (71.0% each). The remaining fourteen parties on the electoral roll for this period have only basic coding (one or two commitments, corresponding to the first objective of the National Agreement) and are excluded from this comparison due to insufficient data.

In the 2021–2026 period, among the eight leading candidates ranked by electoral weight (84% of the valid vote), the winning party (Perú Libre) obtained only 20.0% of commitments at the "High" level, tied at the lowest end of the distribution with Renovación Popular and Avanza País. Victoria Nacional and Alianza para el Progreso topped the distribution (60.0% each), followed by Fuerza Popular and Juntos por el Perú (40.0% each); Acción Popular did not record any "High" level commitments in the coded sample (0.0%).

Cross-sectional Pattern: Electoral Success and Normative Alignment

In the three periods with comparable multiparty coding, the winning party did not occupy the top position in normative alignment in any of the three comparable periods: Gana Perú ranked seventh out of eleven in 2011, Peruanos por el Kambio ranked second out of five in 2016, and Perú Libre fell in the lowest segment of the distribution (tied for sixth place out of eight) in 2021.

This pattern, consistent across the three periods with comparable data, suggests that electoral success in Peru during the period studied is not systematically associated with the specificity and verifiability of the presented government platforms a finding consistent with the diagnosis of weakly institutionalized parties, in which electoral decisions respond to non-programmatic factors (Levitsky, 2018).

Effective Compliance: Preliminary Evidence from the Effective Compliance Index (ICE)

The operationalization of the ICE is now complete for the three administrations whose terms have ended (54 out of 54 "High" alignment commitments IAN Level 2, i.e., consistent verified against primary documentary sources; see Methodology, section "Compliance Variable"). For the Ollanta Humala administration (2011–2016, sixteen commitments), the ICE is 0.375: four commitments were fulfilled as promised (Pension 65; the High-Level Anti-Corruption Commission with the status of law; the universal pension component of a composite labor commitment; and the continuation of the open market economy model), four were partially fulfilled (the education budget; water and sanitation coverage; reforms stemming from the Truth and Reconciliation Commission; and the General Labor Law component of the labor commitment, which was never approved despite having a parliamentary majority), and eight were not fulfilled, including the nationalization of Petroperú and Electroperú, tax reform targeting 18% of GDP, the creation of a Ministry of Science and Technology, the integration of EsSalud and the SIS, and a new Constitution. For the government of " " Perú Libre (2021–2026, represented by Pedro Castillo until his removal in December 2022, five commitments), the ICE is 0.0: none of the five verified commitments was fulfilled, and the case of the commitment to

constitutional change is particularly illustrative, since Castillo not only failed to fulfill it but also attempted to force it through by decree on December 7, 2022 dissolving Congress and convening a Constituent Assembly without the backing of the Armed Forces or the National Police an action that was characterized as a self-coup and led to his own removal from office and arrest in less than three hours. For the 2016–2021 constitutional term, corresponding to the winning party, Peruanos por el Kambio, and successively led by Kuczynski, Vizcarra, Merino, and Sagasti (2016–2021, thirty-three commitments the highest number among the three administrations due to the greater length of the source document) The ICE is 0.379: among the most significant achievements are the reform of the National Council of the Magistracy into the National Board of Justice (following the 2018 "CNM audio" scandal) and the approval of the National Policy on Gender Equality through Supreme Decree No. 008-2019-MIMP (2019); Among the most notable failures to comply are the target to reduce coca cultivation from 42,900 to 25,000 hectares which, instead, nearly doubled by 2020–2022; the target for universal water and sanitation coverage by 2021; the infrastructure investment target of 6.2% of GDP; and the dismantling of the remaining Shining Path forces in the VRAEM, promised for 2018, which did not materialize.

The three ICE values (Humala 0.375, PPK/Vizcarra/Merino/Sagasti 0.379, Perú Libre 0.0) are substantially lower than the level of regulatory alignment that these same governments declared in their commitments, predominantly coded as "High" in the IAN. It is noteworthy that the ICE scores for Humala and PPK are virtually identical (0.375 and 0.379) despite the high level of presidential instability during the latter's second term, while the ICE score for Perú Libre which served a term of just seventeen months (compared to the five-year constitutional terms of the other two administrations) is zero. Overall, across the three administrations, only eight of the fifty-four verified highly specific commitments were fulfilled on the terms originally promised; when partial fulfillment is also considered, twenty-nine out of fifty-four (53.7%) showed some degree of fulfillment (eight fulfilled, twenty-one partially fulfilled, twenty-five unfulfilled).

For the 2026–2031 period, the coding was limited to the winning party in the election (Fuerza Popular), by explicit decision of the research team. Consequently, this period does not contribute evidence to the comparative pattern described above, which requires variation among parties within the same electoral period. Its value for the research design is different: it will serve as an ex ante baseline for the future measurement of the Effective Compliance Index for the only term among the four analyzed periods that has not yet elapsed.

Institutional Determinants: An Initial Approach

Following the paired-case comparison protocol described in the "Method" section ("Institutional Determinants"), Table 1 summarizes two of the four proposed institutional determinants executive stability and initial parliamentary fragmentation along with the IAN and ICE for each period. The other two determinants proposed in the methodological design (CEPLAN's technical capacity and sectoral regulatory density) are not included in this initial analysis because verifiable time-series data are not yet available for each period; they are noted as items for future consideration in the Discussion.

Table 1. *Institutional Determinants and Performance Indicators by Period*

Period (winning party)	Stability of the Executive Branch	Initial parliamentary fragmentation	IAN Position	ICE

2011–2016 (Gana Perú)	0.20 (1 incumbent in 5 years, no vacancies)	Moderate (effective number of parties ≈ 3.4; three main blocs)	7th out of 11	0.375
2016–2021 (Peruvians for Change)	0.80 (4 incumbents: Kuczynski, Vizcarra, Merino, Sagasti)	Decline for the ruling party (the opposition, Fuerza Popular, controlled 73 of 130 seats, 56%)	2nd out of 5	0.379
2021–2026 (Perú Libre)	0.80 (4 members: Castillo, Boluarte, Jerí, Balcázar)	Very high (9 groups represented; no bloc exceeded 30% of the seats)	6th–8th out of 8 (lowest bracket)	0.0
2026–2031 (Fuerza Popular)	Not consolidated (current term)	Not consolidated (current term)	N/A	N/A

Note: Executive Stability = number of executive branch heads divided by the length of the term in years; IAN = Regulatory Alignment Index; ICE = Effective Compliance Index; N/A = not coded/not applicable. Source: author's own calculations.

Note: Executive stability = number of heads of the executive branch divided by the duration of the term in years; IAN = Normative Alignment Index; ICE = Effective Compliance Index; N/A = not coded/not applicable, as this is a current term. Source: author's own calculations.

The data presented yield three descriptive observations that warrant careful interpretation before drawing any inferences about causal mechanisms.

The first observation is that the winning party did not rank first in terms of regulatory alignment in any of the three comparable terms. Gana Perú ranked seventh out of eleven in 2011, Peruanos por el Kambio ranked second out of five in 2016, and Perú Libre ranked in the lowest tier in 2021. This pattern is consistent with Levitsky's (2018) analysis: in a system where electoral outcomes depend on personal leadership and the fragmentation of the competitive field, one would expect that the alignment of a government's platform with state instruments would not be a significant factor in the electoral outcome.

The second observation is that the effective compliance indices for the two administrations with comparable terms of office are virtually identical (Gana Perú: ICE = 0.375; PPK-Vizcarra-Merino-Sagasti: ICE = 0.379). An alternative hypothesis which the data allow us to formulate but not to prove is that what matters is not how many presidents governed but how much time the originally elected party accumulated in office. With N = 3, no single factor can be statistically isolated.

The third observation is that the gap between normative alignment and actual compliance is wide and consistent. All three parties recorded full compliance rates below 40%. This gap could be due to strategic reorientation, discontinuity caused by vacancies, or a temporary collapse of the mandate.

In light of the empirical rejection of the notion that greater initial normative alignment leads to greater compliance, the evidence points in a more modest direction: normative alignment appears to be a characteristic of the electoral platform with little connection to the actual

government agenda. This decoupling empirically supports Levitsky's (2018) thesis regarding the weak programmatic nature of the Peruvian party system.

Two qualitative findings illustrate the complexity of this relationship: the case of the Ministry of Science and Technology (Humala) and that of accession to the OECD (Kuczynski/Castillo), which raises an attribution problem that the comparative literature has not systematically addressed.

The results should be interpreted with their methodological limitations explicitly in mind. Perú Libre's ICE (0.0 out of five commitments over seventeen months) represents a truncation point and is not comparable to ICEs from five-year terms. With N = 3 terms, the patterns described are descriptive observations of specific cases, not estimates of generalizable effects.

Conclusions

This study, based on the systematic coding of government platforms from three consecutive Peruvian elections (2011, 2016, and 2021), shows early indications that electoral success is not directly linked to greater normative alignment or greater programmatic specificity in government plans, which we assess based on their programmatic specificity and the normative verifiability of the State Policies outlined in the National Agreement. The winning party did not rank first in terms of normative alignment in any of the three comparable periods, although its ranking varied from a mid-to-high position in 2016 to low positions in 2011 and 2021. This has been described in the literature on the Peruvian political system as evidence of the presence of weakly institutionalized parties.

The full implementation of the Effective Compliance Index for the three constitutional periods for which ICE verification could be completed (fifty-four out of fifty-four verified commitments) shows that expressing normative alignment in the government's plan does not guarantee compliance. In this case, eight of fifty-four commitments were fully fulfilled, twenty-one were partially fulfilled, and twenty-five were not fulfilled. The Gana Perú and Los Peruanos por el Cambio-Vizcarra-Merino-Sagasti administrations, despite differences in the stability of the presidency, had the same level of compliance (0.375 and 0.379, respectively), while the Perú Libre administration which had the shortest and most turbulent presidency of the three failed to fulfill any of the verified commitments. This evidence shows that the perceived gaps in Peru's strategic planning system correspond to the same arguments presented in the research: a dual gap between what parties promise and what the electorate rewards, and a gap between what governments promise and what they deliver.

Two avenues remain open for future research. First, to expand the depth of coding for the 2016–2021 and 2021–2026 periods beyond the parties and dimensions prioritized in this study, bringing the level of detail closer to that of 2011–2016. Second, to incorporate the two institutional determinants not operationalized in this initial analysis (CEPLAN's technical capacity and sectoral regulatory density), which require direct access to institutional data sets not available in indexed public sources, as well as to expand the number of comparative cases beyond the four Peruvian periods, potentially through subnational or regional comparisons, to provide a more robust test of the hypothesis proposed in the Discussion regarding cumulative tenure as a relevant variable for compliance.

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Developing Artificial Intelligence Skills for Strategic Decision-Making in SMEs: A Simulated Systematic Review

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Introduction

Artificial intelligence (AI) has established itself as a technological resource capable of transforming management and decision-making processes within organizations. Its application is no longer limited to the automation of routine tasks but extends to the processing of large volumes of information, pattern recognition, generating predictions, evaluating scenarios, and supporting strategic decisions. In this context, AI can influence areas such as resource allocation, innovation, risk management, the identification of opportunities, and adaptation to dynamic competitive environments. However, its implementation also introduces new challenges related to data quality, the interpretation of algorithmic results, system transparency, and the distribution of responsibilities among the people and technologies involved in the decision-making process (Jarrahi, 2018; Raisch & Krakowski, 2021).

In small and medium-sized enterprises (SMEs), the adoption of AI presents unique characteristics that warrant a specific analysis. Unlike large organizations, SMEs typically operate with more limited financial resources, less access to specialized personnel, less formalized organizational structures, and a greater reliance on external technology providers. These conditions can affect not only the initial decision to adopt AI-based solutions but also their sustained integration into business processes. Ayinaddis (2025) notes that the dynamics of AI adoption differ according to organizational size, while Oldemeyer et al. (2025) identify multiple barriers associated with its implementation in SMEs, including limitations in knowledge, resources, infrastructure, and internal capabilities. Consequently, the results obtained in large corporations cannot be directly extrapolated to smaller organizations without considering their structural and contextual conditions.

The emergence of generative artificial intelligence (GAI) has further broadened the scope of this discussion. Unlike traditional systems primarily geared toward classification, prediction, or optimization, generative models can synthesize information, produce alternatives, construct scenarios, generate content, and support ideation and problem-solving processes. These capabilities make them potential support tools for various phases of strategic decision-making. Li et al. (2025) highlight their potential to reduce information asymmetries and facilitate

entrepreneurial activities, while López-Solís et al. (2025) and Schulte and Kanbach (2026) caution that human judgment remains particularly relevant when decisions involve ambiguity, uncertainty, risk, or a high degree of context dependence. Therefore, the issue is not merely determining whether AI improves decision-making, but rather understanding under what conditions, at what stages of the process, and through what forms of human–AI collaboration it can generate strategically valuable outcomes.

From an educational perspective, the integration of AI into SMEs also constitutes an issue of continuous professional learning. AI literacy is not limited to operating interfaces but involves understanding the capabilities and limitations of systems, critically evaluating their results, and recognizing implications related to data, bias, transparency, and accountability (Long & Magerko, 2020). In higher and adult education, the literature emphasizes the need to train non-specialists to interact with these technologies in an informed manner and to transfer that learning to professional contexts (Laupichler et al., 2022). This perspective is consistent with DigComp 2.2, which incorporates knowledge, skills, and attitudes for engaging critically, safely, and responsibly with emerging AI-based technologies (Vuorikari et al., 2022). In SMEs, therefore, training can be understood as an organizational capacity that mediates between technological availability and its strategic use.

From a theoretical perspective, the available evidence remains fragmented across different explanatory approaches. The Technology–Organization–Environment (TOE) model allows for the analysis of the conditions that facilitate or hinder technology adoption based on technological, organizational, and environmental factors. For their part, the Resource-Based View (RBV) and the dynamic capabilities approach help explain why companies with access to similar technologies may achieve different results in terms of performance, innovation, or competitive advantage (Barney, 1991; Teece, 2007; Tornatzky & Fleischer, 1990). Complementarily, decision-making process models allow us to identify the specific stages in which AI can intervene, such as problem identification, generation of alternatives, choice, implementation, and feedback (Mintzberg et al., 1976). Integrating these approaches is essential for overcoming a reductionist view in which the adoption of technology is assumed to automatically improve the quality of decisions.

This conceptual fragmentation is compounded by an uneven geographic distribution of the evidence. In Latin America, scientific output on AI applied to business decision-making remains lower than in other regions and is concentrated in a limited number of countries and sectors. Vásquez-Vásquez et al. (2026) show that regional research still has limited coverage and high thematic heterogeneity. In the case of Peru, there are relevant studies on digital transformation, competitiveness, and the modernization of SMEs, such as the study by Rojas García et al. (2023); however, the evidence that explicitly examines the relationship between AI use, the decision-making process, and strategic outcomes remains limited. This gap is particularly significant because institutional conditions, the availability of human capital, digital infrastructure, and the level of technological maturity can substantially alter the effects of AI adoption.

Despite the recent growth in the literature, there is still insufficient integration between studies focused on technology adoption, research on generative AI and human–AI collaboration, and studies analyzing strategic outcomes in SMEs. Furthermore, significant differences persist in the definitions of AI, the conceptualization of strategic decisions, the theoretical frameworks used, and the indicators employed to assess their outcomes. This heterogeneity makes it difficult to determine which AI applications have been studied most frequently, which factors influence their adoption, at which stages of the decision-making process they generate the most value, and what the main limitations of the existing evidence are.

In response to these gaps, this simulated systematic review takes a formative approach to analyzing the evidence on the use of artificial intelligence in strategic decision-making by small and medium-sized enterprises. In addition to identifying technologies, decision-making phases, facilitators, barriers, and organizational outcomes, special attention is given to the AI competencies that emerge as prerequisites for integration and their implications for professional training, lifelong learning, and human-AI governance. The analysis focuses specifically on Latin America and the Peruvian context, with the aim of proposing a research and training agenda applicable to smaller business environments.

Study Selection

The constructed dataset included 797 records: 286 in Scopus, 214 in Web of Science Core Collection, 168 in ScienceDirect, 121 in EBSCO Business Source Ultimate, and 8 identified through citation tracking. After simulated deduplication, 545 records remained for screening; 140 full-text articles were deemed eligible for evaluation, and 52 studies comprised the analytical corpus. These figures illustrate the arithmetic closure logic of a PRISMA flowchart but do not substitute for an actual, verifiable search process.

General Characteristics of the Corpus

The 52 studies were published between 2015 and August 2026. Thirty-five (67.3%) appeared between 2021 and 2025, suggesting an acceleration in interest after 2020. The years with the highest number of publications were 2023 and 2024, with eight studies each. This temporal concentration coincides with the growing interest in AI organizational capabilities and, subsequently, with the emergence of IAG.

Table 1. *Descriptive characteristics of the corpus*

Dimension	Category	n	%
Region/scope	Europe	15	28.8%
	Asia	9	17.3%
	Multiple Countries	8	15.4%
	North America	7	13.5%
	Latin America	6	11.5%
	Africa	5	9.6%
	Oceania	2	3.8%
Sector	Multisector	16	30.8%
	Manufacturing	8	15.4%
	Retail/e-commerce	7	13.5%
	Professional services	6	11.5%
	Logistics/Transportation	4	7.7%
	Financial services/fintech	4	7.7%
	Tourism/Hospitality	3	5.8%
	Agribusiness	2	3.8%
	Health Services	2	3.8%
Design	Cross-sectional quantitative	23	44.2%
	Qualitative interviews/case studies	11	21.2%
	Mixed methods	10	19.2%
	Longitudinal quantitative	5	9.6%

	Quasi-experimental/field	3	5.8%
Type of AI	Predictive machine learning	18	34.6%
	AI-powered analytics/decision support	12	23.1%
	Generative AI/LLM	9	17.3%
	Natural Language Processing	5	9.6%
	Hybrid AI Systems	4	7.7%
	Computer Vision	4	7.7%
Dominant decision-making phase	Intelligence/Problem Definition	14	26.9%
	Design/Generation of Alternatives	13	25.0%
	Selection/evaluation	11	21.2%
	Implementation/resource allocation	8	15.4%
	Monitoring/Feedback	6	11.5%
Dominant Theoretical Framework	TOE	11	21.2%
	RBV	8	15.4%
	No explicit framework	8	15.4%
	Dynamic capabilities	7	13.5%
	TAM/UTAUT	6	11.5%
	Organizational Information Processing	4	7.7%
	Decision-making/Human-AI Interaction	4	7.7%
	Institutional theory	4	7.7%

In the 41 studies with a quantitative or mixed-methods component, the median sample size was 476 units/participants (IQR: 240–693; range: 65–2,403). In the 11 qualitative studies, the median was 33 participants/cases (IQR: 24–40; range: 10–54). These sample sizes were not aggregated into a total sample because the study designs and units of analysis were not comparable.

Trends and Geographic Distribution

The evidence showed a clear increase starting in 2020. Early studies focused on machine learning and predictive analytics, while starting in 2023, studies on AI governance, human-AI collaboration, and AI governance appeared more frequently. Eight studies were multi-country; among the 44 studies with a primary location, Europe accounted for 15, Asia for 9, North America for 7, Latin America for 6, Africa for 5, and Oceania for 2. This distribution confirms a broad international base, though Latin American representation remains limited.

Within Latin America, the corpus included two studies from Brazil, two from Colombia, one from Chile, and one from Peru. This scarcity is consistent with the gap highlighted by the relevant regional literature (Vásquez-Vásquez et al., 2026). From a generalization perspective, this necessitates avoiding universal recommendations based on ecosystems with varying levels of digitization, funding, and regulation.

Types of AI and Stages of the Decision-Making Process

Predictive machine learning was the dominant type of AI (18/52; 34.6%), followed by analytics or AI-powered decision support systems (12/52; 23.1%) and GIA/LLM (9/52; 17.3%). NLP

accounted for 5 studies (9.6%), computer vision for 4 (7.7%), and hybrid systems for 4 (7.7%). The distribution shows that the field cannot be reduced to GAI: most of the accumulated evidence originates from predictive and analytical systems that predate the rise of LLMs.

When each study was classified by its dominant decision-making phase, 14 (26.9%) focused on intelligence or problem definition; 13 (25.0%) on design and generation of alternatives; 11 (21.2%) on selection/evaluation; 8 (15.4%) on implementation/resource allocation; and 6 (11.5%) on monitoring/feedback. This pattern suggests a greater concentration on the early phases of the process. Among the nine IAG studies, seven emphasized the search for, synthesis of, or generation of options, while only two focused primarily on the final selection.

Competencies, Training Needs, Facilitators, and Barriers

Facilitators and barriers were coded as non-mutually exclusive categories. Data preparation and quality was the most frequent factor (31/52; 59.6%), followed by AI and analytics competencies (29/52; 55.8%), support from senior management (27/52; 51.9%), technological compatibility and integration (24/52; 46.2%), and financial resources (21/52; 40.4%). Support from vendors or external ecosystems was cited in 18 studies (34.6%), ethical governance and rules of use in 17 (32.7%), and a favorable regulatory or institutional environment in 13 (25.0%).

Table 4. *Factors Associated with the Integration of AI into Strategic Decisions*

Factor	n	%	Interpretation
Data preparation/quality	31	59.6%	Enabler when present / barrier when insufficient
AI and Analytics Skills	29	55.8%	Enabler when present / barrier when insufficient
Support from senior management	27	51.9%	Enabler when present / barrier when insufficient
Technological compatibility and integration	24	46.2%	Enabler when present / barrier when insufficient
Financial resources	21	40.4%	Enabler when present / barrier when insufficient
Support from providers/ecosystem	18	34.6%	Enabler when present / barrier when insufficient
Governance, ethics, and rules of use	17	32.7%	Enabler when present / barrier when insufficient
Favorable regulatory/institutional environment	13	25.0%	Enabler when present / barrier when insufficient

The synthesis suggests a structure of interdependence. For example, adequate infrastructure does not compensate for a lack of skills in formulating problems or validating results; similarly, having specialized talent may be insufficient if the data is incomplete or if management does not allocate resources. This interaction supports the combined use of TOE and dynamic capabilities, rather than treating each barrier as an isolated variable.

From an educational perspective, the most relevant finding is that AI and analytics competencies appear in 29 of the 52 studies in the scenario (55.8%), as the second most frequent condition. This result does not mean that the corpus evaluated educational programs, nor does it allow us

to attribute effectiveness to a specific training strategy. It does, however, allow us to identify training as a cross-cutting issue: adequate infrastructure is insufficient if people cannot formulate problems, assess data quality, interpret results, verify information, or recognize when an algorithmic recommendation requires human review.

The synthesis, supplemented by AI literacy frameworks, allows us to organize five core areas of professional training: (1) functional understanding of AI and its limitations; (2) problem formulation, data, and evidence; (3) critical evaluation of results, uncertainty, and biases; (4) ethics, privacy, traceability, and accountability; and (5) human-AI collaboration, which includes oversight, verification, and documentation of decisions. These core areas should be understood as a training proposal derived from conceptual analysis, not as an empirically validated taxonomy in the SMEs of the simulated corpus (Long & Magerko, 2020; Laupichler et al., 2022; Vuorikari et al., 2022).

Theoretical Frameworks

TOE was the dominant framework in 11 studies (21.2%), followed by RBV (8; 15.4%) and dynamic capabilities (7; 13.5%). TAM/UTAUT appeared in 6 (11.5%), institutional theory in 4 (7.7%), organizational information processing in 4 (7.7%), and decision-making or human-AI collaboration approaches in 4 (7.7%). Eight studies (15.4%) lacked an explicit theoretical framework. The absence of theory was more common in implementation-oriented exploratory studies than in explanatory studies.

A relevant finding is that frameworks are often used only partially. TOE adequately explains why an SME adopts AI, but not necessarily how that adoption becomes a capability that is difficult to imitate. RBV and dynamic capabilities help explain that transition, while decision models specify the phase in which AI intervenes. Therefore, the theoretical contribution of this review consists of linking adoption, capability, and decision-making integration as distinct analytical levels.

Results, Risks, and Human-AI Collaboration

Thirty-eight studies (73.1%) presented predominantly favorable findings regarding AI's contribution to decision-making processes; 11 (21.2%) reported mixed or context-dependent results, and 3 (5.8%) were null or inconclusive. This coding does not represent an effect size nor does it allow for causal inference; it is used solely to describe the general orientation of the studies' conclusions.

Table 5. *Reported Strategic Outcomes*

Outcome	n	%
Faster decision-making	28	53.8%
Better decision quality/accuracy	25	48.1%
Recognition of opportunities and innovation	21	40.4%
Risk detection and forecasting	18	34.6%
Efficiency in resource allocation	15	28.8%
Strategic agility	14	26.9%

Decision speed was the most frequent result (28/52; 53.8%), followed by quality or accuracy (25/52; 48.1%), opportunity recognition/innovation (21/52; 40.4%), risk detection and forecasting

(18/52; 34.6%), efficiency in resource allocation (15/52; 28.8%), and strategic agility (14/52; 26.9%). The benefits were more consistent when AI was used to structure information or expand alternatives than when the final choice was delegated without verification.

Risks were also recurrent. Issues related to data quality or representativeness appeared in 20 studies (38.5%), overconfidence or automation bias in 17 (32.7%), privacy/cybersecurity in 16 (30.8%), and insufficient explainability or traceability in 13 (25.0%). Among the nine studies focused on IAG, seven (77.8%) identified hallucinations, unverifiable information, or the need for validation as significant limitations.

Only 23 studies (44.2%) explicitly incorporated human oversight into their design, conceptual framework, or recommendations. Supervision was described in 7 of the 9 IAG studies (77.8%) and in 16 of the 43 non-IAG studies (37.2%). This descriptive difference underscores the growing importance of human-AI governance in generative applications, though it should not be interpreted as causal evidence.

Methodological and Psychometric Quality

In the MMAT assessment, 31 studies met all five criteria applicable to their design; 18 had one questionable or non-compliant criterion, and 3 had two or more problematic criteria. These figures are reported to describe the quality pattern, not as an overall score. The simulated inter-rater agreement for the 260 MMAT judgments (52 studies × 5 criteria) was 247/260 = 95.0%, with **κ** = .86. Discrepancies were concentrated in sample representativeness, confound control, and integration of mixed components.

Table 6. *Summary of methodological assessment using the 2018 MMAT*

Study Design	n	5 criteria met	1 criterion with uncertainty	≥2 criteria with uncertainty	Most common problem
Cross-sectional quantitative	23	17	5	1	Sample representativeness, nonresponse bias, measurement/self-report
Longitudinal quantitative	5	4	1	0	Loss of Follow-Up and Justification for Handling Missing Data
Quasi-experimental/field	3	2	1	0	Incomplete control of confounding factors
Qualitative interviews/case studies	11	5	5	1	Reflexivity, saturation, and transparency of the analytical process
Mixed methods	10	3	6	1	Insufficient integration between qualitative and quantitative components

The psychometric analysis was limited to 31 studies that used multi-item scales for constructs such as organizational readiness, trust in AI, intention to use, AI capability, decision-making quality, or resistance. Twenty-seven (87.1%) reported alpha, but only 7 (22.6%) reported omega. Sixteen (51.6%) reported AFC, 13 (41.9%) reported composite reliability and/or extracted

average variance, 11 (35.5%) reported discriminant validity, and only 3 (9.7%) reported measurement invariance. Eighteen (58.1%) reported some procedure to address common method bias, with wide variability in the quality of the control.

This pattern reveals a significant weakness for a field that relies on latent constructs. The predominance of alpha coefficients without sufficient evidence of factor structure or invariance limits comparability across countries, sectors, and firm sizes. Consequently, an agenda for greater rigor should treat measurement as part of the theoretical design rather than as a secondary technical requirement.

The synthesis scenario shows that the adoption of AI and the creation of strategic value must be analyzed as distinct phenomena. The availability of a tool does not guarantee improved decision-making; its effective use depends on adequate data, the skills to formulate and verify analyses, managerial support, technological integration, and governance rules. From an educational perspective, this pattern shifts the focus from mere instrumental training toward professional learning processes capable of developing critical judgment and autonomy in the use of AI systems. This interpretation is consistent with AI literacy approaches that prioritize understanding, applying, and critically evaluating the technology (Long & Magerko, 2020; Laupichler et al., 2022).

The predominance of applications in the intelligence and alternative-generation stages has a functional explanation. These tasks benefit from AI's ability to process large volumes of information, detect patterns, and expand the set of options. In contrast, the final choice involves issues of multiple objectives, legitimacy, ethics, accountability, and tacit knowledge. This distribution is consistent with conceptual evidence on human-AI symbiosis (Jarrahi, 2018) and with recent reviews on AI-G in organizational decision-making (Schulte & Kanbach, 2026).

The proposed framework connects three issues that are typically studied separately. First, TOE addresses the question of whether the conditions for adopting AI exist. Second, RBV and dynamic capabilities explain how technological resources become an organizational capability. Third, the decision-making process approach allows us to identify where that capability is used. This combination avoids two common errors: assuming that adoption is equivalent to strategic use, and assuming that use is equivalent to achieving a superior outcome.

This integration also allows for the formulation of more precise hypotheses. For example, data preparation may have an indirect effect on decision quality mediated by analytical capability, while human-AI governance may moderate the relationship between automation and choice quality. Such relationships require longitudinal or experimental designs and cannot be demonstrated with cross-sectional studies of intention to use.

For an SME, training should begin with specific decision-making problems rather than with the available tool. A relevant training sequence might include: problem diagnosis, identification of necessary data, reasoned selection of technology, verification criteria, risk analysis, decision documentation, and subsequent reflection on performance. This approach transforms training into situated learning, as it links AI concepts to real-world organizational situations and to decisions that require interpreting information, justifying alternatives, and taking responsibility.

Priority competencies go beyond simply using interfaces. They include problem formulation, understanding uncertainty, evaluating evidence, detecting biases, verifying sources, data protection, traceability, and documenting decisions. In generative AI applications, these capabilities take on greater relevance due to the possibility of obtaining plausible but incorrect

answers. Therefore, professional training programs should combine AI literacy, case-based problem-solving, critical analysis of algorithmic outputs, and human-AI oversight protocols, rather than being limited to workshops focused solely on prompts or functionalities.

From the perspective of adult education and lifelong learning, this approach suggests brief, contextualized, and progressive training designs tailored to the roles involved in decision-making. Management roles require competencies in governance, risk, and accountability; analytical roles need greater depth in data, validation, and model evaluation; and non-technical users require criteria for interpreting, verifying, and communicating results. Differentiation by role can facilitate the transfer of learning to the workplace and prevent AI literacy from being treated as a uniform set of content.

Latin America and Peru

The low representation of Latin America limits the ability to apply global findings to contexts with different business and institutional structures. Peruvian evidence should move beyond descriptive studies of digitalization toward models that link data preparation, AI capabilities, governance, decision quality, and performance. Comparisons across sectors, cities, and company sizes are also needed, as well as probabilistic samples or sampling strategies with stronger justification.

Conclusions

The analysis supports the argument in conceptual and training terms that the responsible integration of artificial intelligence into strategic decision-making by SMEs depends on human and organizational capabilities that are not developed simply through the availability of tools. AI training is therefore a central component for transforming technological access into critical, contextualized, and governed use.

Priority competencies are concentrated in five areas: understanding the capabilities and limitations of AI; problem formulation and data use; critical evaluation of results, uncertainty, and biases; ethics, privacy, and traceability; and human-AI collaboration. These areas connect digital literacy with professional learning processes and provide a foundation for designing training programs geared toward real-world decision-making situations.

Training should differentiate between levels and roles within the organization. Management teams require governance and accountability criteria; analytical roles need data, validation, and measurement competencies; and non-technical users must learn to verify, contextualize, and communicate results. This differentiation promotes training that is more context-specific and aligned with the needs of SMEs, which typically operate with limited resources and specialized personnel.

Human-AI collaboration remains a cross-cutting principle. Supervision, source verification, and the documentation of decisions are particularly important when dealing with generative systems capable of producing plausible but incorrect information. Consequently, AI competence must be understood as a capacity for judgment and not merely as a technical skill.

Finally, this study identifies an educational agenda for Latin America and Peru focused on designing, implementing, and evaluating AI literacy programs linked to real-world business problems. Since the quantitative results used in this manuscript correspond to a simulated scenario, a subsequent stage of research should replicate the protocol using a verifiable corpus

and empirically evaluate which training strategies improve competencies and the quality of decisions in SMEs.

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Education and Awareness: Strategies for Addressing Breast Cancer as a Public Health Issue

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Introduction

Breast cancer is one of the leading public health problems worldwide due to its high incidence, mortality, and social, economic, and psychological impact. It is also characterized by significant biological and clinical heterogeneity, which leads to differences in its progression, therapeutic response, and prognosis. Currently, it is the most frequently diagnosed malignant neoplasm in women worldwide, while its burden continues to rise in various regions, particularly in settings where difficulties persist in accessing timely diagnostic and treatment services (Harbeck et al., 2019; Xu et al., 2021).

This situation has spurred the development of international initiatives aimed at reducing mortality and improving health outcomes associated with this disease. Among these, the World Health Organization's (WHO) Global Breast Cancer Initiative stands out, emphasizing the need to strengthen, in a coordinated manner, health promotion, early detection, timely diagnosis, and comprehensive treatment. From this perspective, the approach to breast cancer cannot be limited to the clinical care of patients but requires coordinated interventions among health systems, educational institutions, health professionals, and communities (Harbeck et al., 2019).

The epidemiological magnitude of the problem is evident in international statistics. For 2020, approximately 2.26 million new cases of breast cancer were estimated worldwide, while analyses from the Global Burden of Disease have shown a sustained increase in incidence and an unequal distribution of mortality across different regions. Xu et al. (2021), through an analysis of data from the 2019 Global Burden of Disease Study, identified a considerable burden of incidence, mortality, and disability-adjusted life years associated with breast cancer, confirming its significance as a global health issue.

Epidemiological projections suggest that this burden will continue to rise over the coming decades unless prevention, diagnosis, and treatment strategies are strengthened. This situation is particularly concerning in low- and middle-income countries, where limitations in infrastructure, specialized human resources, and access to diagnostic technologies can lead to the disease being diagnosed at advanced stages. In this regard, Birnbaum et al. (2018) demonstrated that combining early detection strategies with timely treatment can lead to substantial reductions in breast cancer mortality, particularly when interventions are tailored to the capabilities and conditions of each health care system.

In Latin America, breast cancer also represents a top priority. The region faces significant disparities in terms of incidence, mortality, access to diagnosis, and availability of treatments, which are linked to socioeconomic inequalities and the specific characteristics of health care systems. These conditions can lead to delays in diagnosis and limit patients' ability to receive specialized care in a timely manner. Therefore, addressing breast cancer in the region requires strategies that combine the strengthening of health services, prevention, early detection, and public education (Cazap, 2018).

In the Ecuadorian context, breast cancer also constitutes a significant public health problem due to its prevalence and the consequences it has for the female population. In Guayaquil, SOLCA's institutional records for the 2015–2019 period identified breast cancer as the most common malignant tumor among women treated, accounting for 27.05% of female cancer diagnoses recorded during that period. This situation highlights the need to strengthen local strategies for health promotion, prevention, and early detection, particularly through educational initiatives aimed at both the general public and the healthcare professionals responsible for providing care.

Although therapeutic and technological advances have helped improve the prognosis for many patients, the benefits are not distributed evenly. Survival depends on multiple factors, including the stage at the time of diagnosis, the biological characteristics of the tumor, the availability of treatments, and the timeliness with which care is initiated. Consequently, inequalities related to healthcare infrastructure, human resources, and financial access continue to influence clinical outcomes, especially among vulnerable populations (Harbeck et al., 2019; Xu et al., 2021).

In this context, early detection is a strategic component for reducing mortality and improving treatment outcomes. The available evidence supports the importance of screening programs, although their implementation must take into account the epidemiological characteristics and capabilities of each health care system. The systematic review conducted by Henderson et al. (2024) shows that screening strategies must be based on scientific evidence and consider both their benefits and potential risks. Consequently, early detection requires not only technological availability but also an informed population and trained professionals capable of providing women with appropriate guidance.

Health education is therefore an essential component of breast cancer prevention and detection strategies. Educational interventions can help improve knowledge, beliefs related to the disease, and the use of screening services. A systematic review conducted by Noman et al. (2020), which included studies from different contexts, found that educational interventions can promote knowledge about breast cancer and increase participation in screening strategies, although their results must be interpreted with consideration of the heterogeneity of the interventions and the populations studied (Piovet-Hernández et al., 2026).

Awareness is particularly important among young women, a group for whom educational strategies must take into account specific characteristics related to their knowledge, perceptions, and health behaviors. Plunkett et al. (2025), in a systematic review of awareness interventions among women aged 18 to 50, highlight the need to develop more systematic strategies tailored to the characteristics of this population. These findings underscore the importance of ensuring that educational initiatives are not limited to providing general information but also incorporate mechanisms that promote understanding, the recognition of warning signs, and the adoption of preventive behaviors.

Education must also consider the quality and accessibility of the information provided. Currently, digital resources are a common source of information for people seeking content related to

breast cancer. However, the availability of information does not guarantee that it is understandable or useful for decision-making. Gu et al. (2024), through a systematic review and meta-analysis of digital educational materials on breast cancer, identified significant challenges related to their readability and to the assessment of additional dimensions of health literacy. Therefore, health education strategies must ensure that the content is understandable, relevant, and appropriate for the capabilities of the target population.

Furthermore, the impact of breast cancer extends beyond the strictly clinical realm and encompasses psychological, family-related, social, and occupational consequences. Diagnosis and treatment can lead to anxiety, changes in body image, fear of recurrence, and alterations in personal relationships and daily activities. In this regard, comprehensive care must incorporate interventions tailored to patients' psychosocial needs. The evidence synthesized by Setyowibowo et al. (2022) indicates that psychoeducational interventions can help reduce anxiety and improve the quality of life for women with breast cancer, especially when implemented through structured, context-specific interventions.

Within this process, nursing professionals play a fundamental role due to their ongoing contact with patients and their involvement in promotion, prevention, education, follow-up, and care activities. The quality of these interventions depends, to a large extent, on the academic and professional training of the nursing staff. Drury et al. (2022), through a systematic review of educational programs aimed at nurses caring for patients with advanced breast cancer, identified a still-limited educational offering and highlighted deficiencies related to the use of competency standards, pedagogical foundations, and mechanisms for evaluating educational outcomes.

This need to strengthen specialized training has also been recognized through international consensus-building processes. Drury et al. (2023) conducted a Delphi study to determine the content that should be included in an international training curriculum on advanced breast cancer for nursing professionals. Their findings underscore the importance of structuring educational programs with well-defined content and appropriate teaching methodologies, so that professionals' training addresses the complex needs of cancer care.

Complementarily, the education of patients and professionals can be supported by new technologies and digital resources. Digital tools make it possible to expand access to specialized content and provide information in a flexible manner; however, their use must take into account criteria related to quality, accessibility, and health literacy. In this regard, recent evidence on digital interventions and educational materials shows that technology can serve as a complementary resource, but its effectiveness depends on the quality of the content and its suitability for the characteristics of those who use it (Gu et al., 2024).

Furthermore, advances in molecular biology, personalized medicine, and new therapeutic alternatives have progressively transformed the approach to breast cancer. The molecular characterization of tumors allows for the development of more individualized therapeutic strategies, although access to these innovations remains unequal. This reality reinforces the need for healthcare professionals to engage in ongoing professional development that enables them to understand scientific advances and translate them into relevant educational and care interventions (Harbeck et al., 2019; Caicedo Quiroz & Caicedo Quiroz, 2026).

Consequently, breast cancer must be addressed from a comprehensive public health perspective that integrates prevention, education, early detection, diagnosis, treatment, and psychosocial support. Evidence shows that educational strategies can help improve knowledge and behaviors

related to screening, while specialized training for professionals helps enhance the quality of care and the responsiveness of health care systems (Noman et al., 2020; Drury et al., 2022).

Within this framework, strengthening the knowledge and competencies of future nursing professionals regarding breast cancer is a key strategy for improving promotion, prevention, and timely screening efforts. University education must provide tools that enable students to understand the clinical aspects of the disease and, at the same time, develop the skills to educate the public, identify risk factors, recognize warning signs, provide guidance on screening options, and promote timely access to health services. This need takes on particular importance given the gaps identified in specialized oncology nursing education (Drury et al., 2022; Drury et al., 2023; Jara Tenemaza et al., 2026).

In this context, this study aims to analyze the level of knowledge and the role of nursing in the prevention and control of breast cancer as a current health issue among students in the Bachelor of Science in Nursing program at the Bolivarian University of Ecuador, with the goal of generating evidence that contributes to strengthening the academic training and professional competencies necessary to carry out actions related to promotion, prevention, education, and timely detection of this disease.

The results obtained made it possible to identify the general level of knowledge among Bachelor of Nursing students regarding breast cancer, considering aspects related to its recognition as a health issue, risk factors, preventive measures, and the importance of early detection. Figure 1 presents the percentage distribution of the main responses obtained.

Regarding students' perceptions of the impact of breast cancer, aspects related to the severity of the disease, the importance of community education, and the need to strengthen preventive and early detection measures were explored. Figure 2 presents the percentages obtained for each of these aspects.

Although the results show that students have a general understanding of the magnitude and relevance of breast cancer as a public health problem, gaps were also identified in their mastery of specific knowledge related to risk factors, preventive measures, and early detection. This situation highlights the need to strengthen the academic training of future nursing professionals through a more systematic incorporation of content related to oncology and, in particular, to the prevention and control of breast cancer.

In this regard, it is important to strengthen oncology content within the nursing curriculum, promoting not only theoretical knowledge of the disease but also the development of competencies focused on health promotion, risk factor identification, health education, and guidance for timely detection. Likewise, it is important to encourage student participation in research activities related to the prevention and early detection of breast cancer, so that they can develop the ability to analyze health issues in their own context and propose interventions based on scientific evidence.

Similarly, it is considered necessary to create opportunities for practical training and community engagement, in which students can develop skills in health education, the promotion of self-care, and guidance on available strategies for early detection. Integrating theoretical training, clinical practice, research, and community work would strengthen the role of nursing as an agent of health promotion and prevention, contributing to a more comprehensive and relevant professional education in the face of the challenges posed by breast cancer as a public health issue.

The results show that most students recognize breast cancer as a priority public health issue. This finding is encouraging, as it demonstrates a general awareness of the magnitude of the disease and the need to develop preventive measures. However, recognizing the problem does not necessarily imply sufficient mastery of specific knowledge regarding risk factors, prevention, and early detection.

In this regard, Islam et al. (2022) found that students in health-related fields had higher levels of knowledge about breast cancer, although gaps persisted in certain preventive components. Similarly, Osei-Afriyie et al. (2021) identified a discrepancy between general knowledge about breast cancer and the adoption of preventive practices, highlighting the need to strengthen this content during university education.

In the present study, a significant proportion of students recognized the importance of early detection. This finding is consistent with Omar et al. (2020), who demonstrated the importance of strengthening health sciences students' knowledge and attitudes regarding early detection methods. However, understanding the importance of detection does not necessarily guarantee the adoption of preventive behaviors.

Meram et al. (2025) found that health knowledge and beliefs are associated with the practice of breast self-examination among nursing and midwifery students, while Aksuoglu and Ozsaker (2025) highlighted the influence of breast cancer awareness and health beliefs on the preventive behaviors of nursing students. Taken together, this evidence suggests that education should integrate knowledge, attitudes, and practical skills.

Another relevant finding concerns the recognition of community education as a preventive strategy. This perspective is particularly important for nursing, given the role this profession plays in promoting public health and educating the population. Ibrahim et al. (2024), in evaluating nursing students' knowledge and attitudes toward male breast cancer, identified gaps that justify the incorporation of broader oncology content into professional training. Although their study population and specific focus differ from the present study, their results reinforce the need for future professionals to develop educational competencies that enable them to address cancer prevention from a comprehensive perspective.

From a curricular perspective, the results obtained suggest that oncology education is an area ripe for strengthening. Moncaliano et al. (2023) demonstrated that the implementation of a virtual curriculum increased students' exposure to different oncology subspecialties, highlighting the potential of structured educational strategies to expand learning opportunities. Consequently, it is appropriate to strengthen the nursing curriculum through up-to-date oncology content, practical activities, community experiences, and educational strategies that link theoretical knowledge to the real needs of the population.

Finally, the findings support the need to promote comprehensive training that integrates scientific knowledge, prevention, community education, and practical skills. The incorporation of active learning methodologies, community engagement experiences, and opportunities for student research can help prepare nursing professionals with greater capacity to participate in strategies for health promotion and the early detection of breast cancer. In this way, university education can become a strategic component in strengthening the health systems' response to this disease.

Conclusions

The results obtained allow us to conclude that undergraduate nursing students have a favorable perception of breast cancer as a public health issue, recognizing its impact and the importance of developing actions aimed at its prevention and early detection. This perception constitutes a strength within the educational process, as it demonstrates sensitivity to an issue of high public health relevance.

However, the results also reveal gaps in specific knowledge regarding risk factors, preventive measures, and early detection. General awareness of the disease is not always accompanied by sufficient mastery of the elements necessary to effectively carry out educational and preventive activities. Consequently, it is considered necessary to strengthen the academic training of future professionals from a perspective that integrates theoretical knowledge with practical skills.

Furthermore, it is concluded that students recognize community education as a fundamental strategy for breast cancer prevention and value the importance of early detection. This perception represents an opportunity to strengthen the role of nursing as an agent of health promotion, particularly in health education activities, risk communication, public guidance, and the promotion of preventive behaviors.

Based on these findings, it is recommended that the nursing curriculum be strengthened by incorporating up-to-date content on breast cancer, risk factors, prevention, early detection, and community education. This content should be developed in a cross-curricular and progressive manner, ensuring that oncology training is not limited exclusively to clinical courses.

It is also recommended to implement practical educational strategies, such as workshops, simulations, case studies, health education activities, and community- y outreach experiences. These methodologies would enable the transformation of theoretical knowledge into competencies applicable to real-world scenarios and would better prepare students to perform preventive roles.

Similarly, it is important to promote student research related to breast cancer, particularly in areas such as risk factors, knowledge, attitudes, preventive practices, barriers to early detection, and educational strategies. This would simultaneously strengthen research skills and deepen understanding of the population's health needs.

Finally, it is recommended to develop university and community health education campaigns with the active participation of nursing students and faculty. These initiatives should focus on recognizing risk factors, warning signs, the importance of timely medical consultation, and the promotion of healthy habits, thereby helping to consolidate a professional education committed to prevention, equity, and public health.

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Informal Education and Learning in the 21st Century: Open Classroom

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Introduction

In recent years, digital platforms such as YouTube have evolved from mere entertainment spaces into true informal learning environments. For adolescents and young adults especially those involved in technology education YouTube represents an accessible, fast, and visual source of knowledge that addresses their immediate interests. In Ecuador, this trend has intensified, revealing a transformation in the ways people learn, teach, and start businesses.

But beyond the content, it is the visual presentation that amplifies its impact. YouTube speaks the language of images: colorful thumbnails, dynamic transitions, animated graphics, a variety of camera angles, visual effects, and an aesthetic that captures attention. For young viewers, accustomed to speed and visual diversity, this platform offers a sensory experience that traditional education rarely achieves.

Seeing, watching, and appreciating not just listening or reading become a gateway to knowledge. This concise set of verbs perhaps sums up the ideas that educators should focus on in today's education to help students solve complex problems and adapt to a constantly changing environment. (Cusme-Vélez, 2023)

This article stems from an everyday observation: young people learning to repair cell phones, design circuits, program, or start businesses through YouTube tutorials. But it also draws on academic reflections such as those of Luna Scott (2015), who, speaking on behalf of UNESCO, warns that schools must adapt to new student profiles, their shifting interests, the challenges of the labor market, and, above all, the growing problem of school dropouts.

This paper seeks to draw attention to a silent transformation: young people who are learning, starting businesses, and educating themselves on YouTube, drawn to its visual appeal and immediate usefulness, while schools struggle to remain relevant in a world that has already changed.

Thus, the objective is to highlight and examine the use of YouTube as a space for informal learning among young people pursuing technology-related education in Ecuador, emphasizing its visual power and its ability to respond to the pressing needs of this generation, in contrast to the limitations of formal education.

The aim is thus to view YouTube not only as a source of content, but as an open classroom that captivates through its visual appeal, motivates through its accessibility, and teaches through

shared experience. A platform that challenges formal education to rethink itself not through competition, but through dialogue.

To fulfill this purpose, this article first presents the theoretical foundations for understanding informal learning and its growing relevance in the 21st century. Next, it outlines the profile of young people pursuing technological education in Ecuador and analyzes their relationship with YouTube as a space for visual learning. Next, specific examples of visual pedagogy on the platform are explored, leading to a reflection on the pedagogical implications of this phenomenon and proposals for courses of action in teacher education.

In today's society, as Vega, Núñez, and Ramírez (2023) note, images have become points of reference for understanding everything around us. The pace of modern life is characterized by everyday social practices marked by simultaneity and speed. (p. 9)

Informal Education: An Alternative or a Warning Sign?

Informal learning, defined through a synthesis of diverse research by Quintero-Rodríguez and Colás Bravo (2024), is conceived as the process of acquiring knowledge through non-traditional means, without institutional support, in which learners play an active role throughout the process. In this approach, self-regulation of the learning process is integrated, meaning that the individual decides what to learn, when to learn it, where to seek information, and from whom to learn it (Alshamsi and Ogdol, 2022; Fedele, Aran-Ramspott, and Suau, 2021; Lange, 2019), cited by Quintero-Rodríguez and Colás Bravo (2024).

Thus, it is clear that informal education defined as education that takes place outside institutional frameworks has gained prominence in the 21st century. YouTube, with its vast universe of content, has become an open classroom where young people find immediate answers to their questions. In particular, students in technology-related fields value the ability to learn at their own pace, through visual means, and with practical examples that they often cannot find in the traditional classroom.

However, this shift toward informal learning also reveals a crisis: many young people are dropping out of formal education because they do not find what they need there. As Luna Scott (2015) warned, a lack of interest in studying and high dropout rates are linked to a disconnect between school and students' real-life experiences.

YouTube's visual nature is not merely appealing it fulfills a vital need. For many young people, especially those navigating technology education in contexts like Ecuador's, the platform becomes a space where learning takes place amid personal, professional, and social pressures. This is not merely an aesthetic preference, but an adaptive response to an environment that demands immediacy, autonomy, and practical solutions.

In this scenario, it is essential to pause and observe who these young people are, how they live, what drives them to seek outside the classroom what they cannot find within it, and why YouTube with its visual language, accessibility, and promise of practicality becomes an educational refuge. Understanding their profile, motivations, and challenges allows us to better grasp the educational phenomenon we are witnessing.

When Life Doesn't Wait: Tech-Savvy Youth, School Dropouts, and YouTube as a Digital and Visual Haven

Students enrolled in Higher Technical Education (FTS) in Ecuador have a distinct profile that reflects the social, economic, and cultural transformations of the 21st century. According to Carlin Chávez (2023), these young people tend to be slightly older than traditional college students, come from low-income households, and often work and study simultaneously. Many of them have already started families, which entails additional responsibilities that shape their time, energy, and priorities.

Added to this is the fact that, as Herrera Navas (2023) points out, technical and technological education has historically been perceived as a less prestigious educational option, even though it plays a crucial role in the country's economic development. However, only 12% of students enroll in this type of program, and the programs are often not aligned with the real needs of the workforce or with the aspirations of young people.

The study by Balwin Chuquillangui et al. (2019) provides a more detailed segmentation of these students, identifying profiles ranging from high achievers to those with academic difficulties, as well as students who are highly motivated by their field of study. This diversity calls for differentiated pedagogical strategies that are sensitive to their contexts.

For their part, Guillén Pereira and Erazo Luna (2022) highlight that, in the wake of the pandemic, there has been a push to expand academic offerings and facilitate access to technical and technological higher education. However, challenges persist, such as early dropout rates, which the government aims to reduce from 21.84% to 19.89% by 2025. The need to obtain an intermediate degree that allows for rapid entry into the labor market is one of the main motivations for these young people.

This situation is intertwined with the warnings of Cynthia Luna Scott (2015) from UNESCO, who points out that many students drop out of school because they find it neither useful nor motivating, nor do they see a connection between it and their interests. School, she says, must transform to respond to the new habits, languages, and expectations of young people, who no longer conceive of learning without the support of digital tools, social media, and platforms like YouTube.

A review of these studies reveals not only how young people learn outside of school but also how schools can learn from them. The 21st-century teacher should not fear YouTube but rather ask how to turn their classroom into a space as meaningful as the channel their students can't stop watching.

In this context, YouTube emerges as both a refuge and an opportunity. For these young people, who face economic, family, and social pressures, the platform offers a fast, visual, and accessible way to acquire practical knowledge. From technical repair tutorials to entrepreneurship strategies, YouTube becomes a sort of "digital mentor" that responds to their immediate needs. Its visual aesthetic vibrant colors, dynamic editing, and relatable language acts as a magnet for a generation that learns by watching, trying, and doing.

Thus, a paradox emerges: many young people turn away from formal education because they cannot find answers to their immediate needs there, but they end up returning to it when they

discover that, to sustain their ventures or advance professionally, they need more structured training.

YouTube, then, does not replace school, but it does challenge it. It challenges it to reinvent itself, to speak the visual and practical language of a youth that cannot wait.

Youth Entrepreneurship: Between the Streets and the Internet

In Ecuador, it's common to find young entrepreneurs who launched their projects thanks to what they learned on YouTube. From small technical repair shops to their own educational content channels, these young people demonstrate that informal learning can be a driving force for action.

However, experience also shows that, to sustain and scale their ventures, they eventually need more structured training: administrative, legal, and financial knowledge which is often absent from tutorials. And not only this type of knowledge, but also more specialized knowledge that ensures the sustainability of their business or venture: namely, knowledge about their product's features, which demonstrate that it can be used properly, instill consumer confidence in purchasing it, and highlight its quality and competitive edge.

This is, metaphorically speaking, the double-edged sword of content for informal learning on that platform: YouTube motivates, sparks interest, and offers initial tools. But to consolidate a project, young people must return to or reconcile with formal education. Schools, then, should not compete with YouTube, but rather learn from its dynamism and adapt to new ways of learning.

YouTube as an open classroom is not a threat, but an opportunity. The key lies in recognizing that young people are already learning, but they do so in other spaces, using different languages and at their own pace. Formal education must open up, engage with informal learning, and build bridges that allow students to move between both worlds without getting lost along the way.

From an educational perspective, many teachers have already come to understand that in the 21st century, students are characterized as builders of their own knowledge; they are active participants in managing the information needed to transform it into knowledge. They can identify information presented in various formats images, texts, graphics, videos, audio, and multimedia which enables them to capture what interests them, study it, and process it. (Paredes, Campoverde, and Játiva, 2021).

Thus, in the 21st century, learning no longer takes place solely in the classroom. It happens on the street, online, and through experience. And if schools want to remain relevant, they must listen, adapt, and support students. "Schools must transform themselves to respond to the interests, languages, and media that students already use if they want to avoid growing disinterest and school dropout rates" (Luna Scott, 2015).

As Quintero-Rodríguez and Colás-Bravo (2022, 2024) point out, the visual appeal of YouTube vibrant colors, dynamic editing, attractive design is not merely decorative but a pedagogical resource that resonates with young people's sensibilities. This visual aesthetic, combined with accessibility and the ability to learn on demand, makes YouTube a highly effective informal learning environment. In line with these ideas, Luna Scott (2015) notes that formal education must adapt to these new languages if it is to remain relevant to a generation that already learns in other spaces.

Visuality as a Non-Institutional Pedagogical Resource

In the digital universe, the image is not just an accessory it is the message. YouTube, as the visual platform par excellence, has transformed the way young people learn, especially those engaged in technology education. Visuality vibrant colors, dynamic editing, narrative rhythm, thumbnail design, and the use of graphics and transitions becomes a pedagogical resource that requires no classroom, curriculum, or teacher to function.

As Quintero-Rodríguez and Colás-Bravo (2022, 2024) point out, this visual aesthetic is not merely decorative but a strategy that resonates with young people's sensibilities. In their studies, they demonstrate that YouTube's visual elements facilitate understanding, increase motivation, and enable faster assimilation of content. Learning occurs through watching, through the repetition of a gesture, and through the detailed observation of a technical process demonstrated step by step.

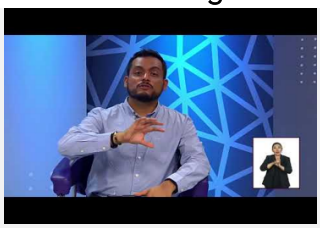
This type of non-institutional pedagogy follows a different logic: it is based not on obligation, but on desire. Young people do not watch videos because they have to, but because they want to learn something that is useful to them, that interests them, or that solves an immediate problem. Visuality, then, acts as a bridge between need and knowledge.

Cynthia Luna Scott (2015) reinforces this idea by stating that 21st-century students have high expectations regarding how they learn. They prefer digital media, value the ability to choose their own learning conditions, and possess a deep understanding of how to use visual tools to their advantage. In this context, YouTube becomes a personalized learning environment, where every video is a lesson, every creator a tutor, and every view an opportunity to move forward.

Visual content on YouTube does more than just teach: it captivates, guides, and accompanies. It is a pedagogy of the image that operates outside of school but directly challenges its methods. In a world where time is of the essence and attention spans are fleeting, learning by watching has become a legitimate and effective way to acquire knowledge.

YouTube offers concrete examples of how visuality becomes a powerful pedagogical resource, especially for young people in technology education. There are videos that illustrate how visual design, narrative rhythm, and aesthetic clarity enhance informal learning.

Table 1. *Examples of how visuality becomes a powerful pedagogical resource.*

Video Title	Content Shown	Video Image
Interactive Video Lessons: An Educational Resource for	This video shows how visual resources can structure complex content in a clear and engaging way. It uses animations, diagrams, and colors to hold the viewer's attention ideal for students who learn best by watching and doing.	
Revolutionize Your Learning with Educational Videos	Here, we explore how the combination of visual, auditory, and textual elements creates a multisensory learning experience. It's	

	a perfect example of how aesthetics don't just decorate they teach.	
Technology for Education I Impacta	This video showcases technological innovations applied to education, with a visual approach that helps viewers understand abstract concepts through concrete examples and dynamic visualizations.	
Examples of YouTube's Use in Education I 59/141 UPV	A tour of real-world examples of YouTube's use in education, recorded by students. It shows how visual language adapts to different contexts and educational levels.	
Digital Resources	This video explains what digital resources are and how they are integrated into teaching. Its clear visual structure and well-organized narrative make it a model of accessible visual pedagogy.	
New Technologies Applied to Education	An example of how visual media can support critical reflection on the role of technology in teaching. It includes interviews, graphics, and practical examples.	

Source: Original work. 2025

As seen in the examples presented, visual elements not only serve an aesthetic function but also structure content, guide attention, and facilitate understanding. These videos are not merely audiovisual media but authentic pedagogical tools that use imagery, pacing, and narrative to create meaningful learning experiences.

These findings invite us to rethink the role of schools in the face of new ways of learning. YouTube's pedagogical effectiveness lies not only in its content but also in its ability to connect with the cultural and visual codes of young people. This observation raises an unavoidable question: What can formal education learn from this digital aesthetic?

Suggested reflection: What can schools learn from this aesthetic?

Visuality on YouTube is not just a matter of style: it is a strategy for communication and learning. Its ability to show rather than just tell, to narrate rather than just inform, and to captivate rather than just instruct offers valuable insights for rethinking formal education.

Without proposing a direct solution, these examples invite schools to observe closely: How is interest sparked? How is attention sustained? How is a concept translated into an image? Perhaps it is not a matter of imitating YouTube, but of learning from its language to enrich our

own. Because in a world where young people already learn by watching, the image is not a luxury it is a pedagogical necessity.

A pedagogy that observes, alerts, and accompanies

The educational reality of the 21st century cannot ignore the fact that many young people drop out of school, not because of a lack of ability, but because of a lack of connection. Life pressures them: family responsibilities, financial emergencies, unplanned life paths. In this context, YouTube emerges as a visual, practical, and accessible refuge. But it also serves as a warning sign: if young people are learning outside the classroom, what is failing inside it?

Formal education should not compete with YouTube, but rather learn from its language. Visuality, narrative, aesthetic clarity, rhythm, and immediate utility: all these elements can inspire a pedagogical renewal that does not imitate, but rather engages in dialogue. As Luna Scott (2015) rightly points out, change is not optional it is urgent.

And here lies the hopeful proposal: continuing teacher education as a space for response. Not to impose solutions, but to raise reflective questions.

- How do we foster interest in the classroom?
- How do we sustain attention in times of distraction?
- How do we translate a concept into an image, an experience, an emotion?

Training teachers who dare to look beyond the curriculum, who understand visual languages, and who recognize their students' life journeys is a commitment to a more humane, more connected, and more meaningful education.

Because, although many young people drift away from school, the path to professional sustainability brings them back. And when they return, they need to find an education that understands them, inspires them, and supports them an education that not only teaches but also listens.

This section presents the main findings derived from the documentary and contextual analysis conducted. These results are not presented as quantifiable data, but rather as emerging categories that allow for an understanding of the educational phenomenon from a qualitative, situated, and critical perspective. Through a review of academic sources and the observation of youth practices in digital environments, we identify key dimensions that shape the relationship between young people in technology training and the use of YouTube as a space for informal learning. The findings are organized around four thematic areas: the sociocultural characterization of students, school dropout as a structural phenomenon, visuality as a pedagogical resource, and specific examples of visual pedagogy on the platform.

Findings from the Documentary and Contextual Analysis

The document analysis conducted identifies a series of key findings that shape the profile of young people involved in technology education in Ecuador and their relationship with digital environments for informal learning, particularly YouTube. These findings emerge from a review of doctoral dissertations, scientific articles, and recent institutional studies, and are linked to observations on youth practices on visual platforms.

Characterization of Young People in Technology Education

Students in higher-level technology training programs in Ecuador exhibit a series of distinctive traits that set them apart from the traditional university profile. According to Carlin Chávez (2023), these are slightly older young people, many of whom are already married, have children, and are actively employed. They come from low-income households and often enter these programs with gaps in basic skills such as reading, writing, and mathematics. This reality shapes educational trajectories marked by urgency, the need for immediate employability, and the search for practical solutions.

Herrera Navas (2023) expands on this characterization by noting that technical and technological education has historically been perceived as a less prestigious option, even though it plays a crucial role in the country's socioeconomic development. Low enrollment rates and the disconnect between academic offerings and social demands further exacerbate these students' vulnerability.

School Dropout and Life Emergencies

Cynthia Luna Scott's (2015) review adds a global dimension to the phenomenon of school dropout, highlighting that young people face multiple social, cultural, and economic obstacles that hinder their ability to continue their studies. Disengagement from school, apathy in class, and a lack of connection between course content and everyday life are recurring factors. In this context, dropping out is not an isolated decision but rather the result of an accumulation of pressures that push young people out of the formal education system.

YouTube as a Space for Visual Learning

In the face of these limitations, YouTube emerges as an informal learning environment that meets young people's immediate needs. As Quintero Rodríguez and Colás Bravo (2022, 2024) point out, the visual elements on YouTube vibrant colors, dynamic editing, and attractive design are not mere embellishments but pedagogical resources that resonate with young people's sensibilities. The ability to learn on demand, to repeat visual processes, and to observe a technique or strategy step by step transforms the platform into a kind of "digital mentor" that teaches through shared experience.

Examples of Visual Pedagogy on YouTube

Watching educational videos on YouTube allows us to identify visual patterns that enhance learning:

- Use of animations, diagrams, and transitions to explain technical concepts.
- Visual narratives that combine text, images, and voice in sync.
- Hands-on tutorials that demonstrate processes step by step, facilitating imitation and understanding.
- Visually appealing design that captures attention and encourages independent exploration.

These elements constitute a non-institutional pedagogy that operates through imagery, practicality, and the desire to learn in contrast to the rigidity of many formal settings.

The findings of the documentary and contextual analysis open up an urgent conversation about the role of visuality in youth learning processes, especially in contexts of educational vulnerability. Far from being a superficial or fleeting phenomenon, the use of YouTube as a self-

directed learning environment reveals a profound transformation in the ways knowledge is accessed, constructed, and validated.

Visuality, in this context, is not a decorative resource, but rather a cognitive and affective strategy that responds to the living conditions of young people. Image, rhythm, color, editing, design: all these elements constitute a pedagogical language that directly engages a generation that learns by watching, doing, and repeating. As Quintero Rodríguez and Colás Bravo (2022, 2024) note, this visual aesthetic not only facilitates understanding but also generates a meaningful, autonomous, and emotionally connected learning experience.

From this perspective, YouTube is not merely a content platform but a cultural space for informal learning, where young people find answers to their technical, professional, and personal needs. In a context where formal education often fails to adapt to the pace, interests, and life paths of its students, the platform becomes a visual refuge that teaches through practicality and desire.

However, this reality also gives rise to tensions. Dropping out of school, far from being a free choice, appears to be a consequence of multiple structural factors: economic precariousness, curricular disjointedness, and a lack of connection between school and real life. The shift toward digital learning environments does not always imply a break with formal education, but rather a search for more accessible, faster, and more visual alternatives.

This is where visuality becomes a critical category for rethinking pedagogy. As Luna Scott (2015) points out, 21st-century education must recognize new languages, media, and ways of learning if it is to remain relevant. It is not a matter of imitating YouTube, but of understanding what makes it effective: How is interest sparked? How is attention sustained? How is a concept translated into an image?

These questions do not seek immediate answers, but rather aim to open up a space for reflection on teacher training, curriculum innovation, and the design of educational experiences more closely aligned with contemporary sensibilities. Because while many young people drop out of school, they do not abandon their desire to learn. And that desire, when combined with a visual, relatable, and meaningful pedagogy, can become a driving force for transformation.

Conclusions

The analysis conducted confirms that YouTube has established itself as a highly effective informal learning environment for young people pursuing technological education, especially in contexts of educational vulnerability such as Ecuador's. Its visual nature dynamic, engaging, and accessible not only facilitates the understanding of technical content but also connects with the life trajectories of a generation that learns out of a sense of urgency, autonomy, and desire.

Formal education, by contrast, faces the challenge of remaining relevant in the face of these new languages and practices. Dropping out of school is not simply an individual decision but a symptom of a structural disconnect between school and life. In this scenario, visuality emerges as a pedagogical category that directly challenges traditional models of teaching.

However, the path is not closed. Continuing teacher education emerges as a legitimate and promising avenue for rethinking educational practice through key questions questions that do not seek immediate answers but rather aim to open spaces for reflection, innovation, and dialogue. For although many young people turn away from school, the desire to learn persists.

And when that desire meets a visual, meaningful, and connected pedagogy, it can become a driving force for personal and social transformation.

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The Legal Capacity of Nature in Roman Civil Law to the Present Day

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Introduction

Since the dawn of civilization, it has been well known that Rome is the cradle of law. In ancient times, it was precisely within Roman civilization that the main institutions governing law as we know it today were born. Specifically, it must be taken into consideration that, although writing did not exist in ancient times, it is nonetheless true that an effort was made to condense the main ideas of jurists and philosophers through the Corpus Iuris Civile. (De Castro, 2016)

Given the above, it is considered a matter of great significance to analyze nature from the perspective of Roman law up to the present day as a legal institution, taking into account its evolution; the topic is significant in terms of both importance and novelty, since nature is currently playing a major role in the constitutions and laws of Latin America, particularly in Ecuador, where it is viewed as a subject of rights with special characteristics serving as the primary focus of this study. (Constituent Assembly, 1998)

To develop this article, the scientific problem posed is a historical-legal study of the evolution of nature's legal capacity. In light of the foregoing, the main objective is to analyze nature and its legal capacity from Roman times to the present; and the specific objectives are: to determine the definition, legal nature, and scope of nature from Roman times to the present; and to establish the legal capacity of nature in Ecuador as a subject of rights. (National Assembly, 2015)

Having provided this brief preamble, it is time to begin the proposed work. As a first step, it is necessary to define what is meant by "nature," and the definition provided by the Constitutional Court of Ecuador in Ruling No. 253-20-JH-/22 of January 27, 2022, is considered comprehensive. This ruling states, among other things, that nature must be regarded as an interrelated, interdependent, and indivisible set of biotic and abiotic elements that is, nature is a community of life.

This definition is considered one of the most comprehensive for this study, since it makes no distinction whatsoever among the different ecosystems that form part of nature, and it also includes living beings without distinction of any kind.

In general terms, legal capacity arises from the law and is inherent to human beings which is what was known as "status" in Justinian's Roman law.

This "status" initially applied exclusively to paterfamilias and, more generally, to Roman citizens.

In the Digest and the Institutions, concepts such as "person" and "status" were defined. However, it should be noted that in Rome, people were classified according to their capacity to acquire rights; this classification consisted of "civitatis," "libertatis," and "familiae," where the first referred to being Roman or a citizen, the second to being free, and the third to one's place within a family. (Pérez A., 1639)

Since the time of Justinian, this classification of legal capacity which they termed "status" has existed and persisted over the centuries. This refers to the capacity inherent in being a person and the ability to exercise rights by virtue of that very status. (Donellus, 1840)

Subsequently, another division of "status" emerged that went hand in hand with the aforementioned trilogy of classes of persons; these were the status naturalis and the status civilis, the former corresponding to nature and the latter to persons. (Gottlieb, 2010)

Finally, regarding the term "capacity," in Roman law as well as in the Corpus Iuris Civilis it appears in Latin as "capax" and was conceived as the ability to take something and thereby receive it (*quod capit, seu continet, aut continere possit*) (Nebrija, 1778) .

In Roman law, capacity was not as developed as "status"; rather, "capax" was more focused on property matters and issues related to crimes. The terms "personae" and "status" were more commonly used, as noted above.

Over time, the word "capax" also came to be associated with obligations, particularly in reference to the fulfillment of obligations and the timely payment of debts.

Continuing with the historical analysis of legal capacity and the creation of the term "holder" or "subject" of law, we arrive at Savigny, who established the link between "status" and capacity, defining what is known today as "legal capacity": that is, in simple terms, the capacity to act, which is intimately linked to the mere fact of being a person. (Savigny, 1855)

Elaborating on this idea, Savigny notes that this legal capacity may be restricted or extended by legal norms, and it is precisely this aspect that allows for the existence of legal fictions through which entities that are not natural persons are granted the status of subjects of rights with legal capacity such as legal entities. (Savigny, 1855)

Over time, the scope of this concept expanded, and today it is granted to all human beings what is understood as the capacity to enjoy rights while other entities are granted the capacity to exercise rights, which stems from legal provisions.

Currently, legal capacity is understood as the ability of individuals to acquire rights and assume obligations; this is the simplest conceptualization that could serve as an introduction to this section.

Legal capacity is conceived as an attribute of legal personality, which is essential for acquiring rights and assuming obligations, as well as for executing and enforcing them. Capacity, therefore, is intrinsically linked to being the holder of rights.

From a doctrinal perspective, it should be noted that when referring to legal capacity, a distinction is made between two types of capacity: capacity to enjoy rights and capacity to exercise rights.

According to the author Parraguez, the former is intrinsically linked to the human being; that is, the mere fact of being a natural person is sufficient proof to hold rights. (Parraguez, 2020) , while the latter refers to the ability to exercise those rights and, consequently, to assume obligations.

In our country, legal capacity is regulated by the Civil Code, specifically Article 1461, which defines it as the ability to enter into legal obligations on one's own without the need for or authorization from a third party. This creates a legal presumption that every person is legally

capable, except for those whom the law itself deems incapable, as provided for in Article 1462 of the Civil Code. (National Congress, 2005) .

Along the same lines, the Civil Code itself establishes that legal incapacities exist precisely to define exceptions to the legal principle outlined above; these incapacities are classified as absolute, relative, and special.

First, it is important to note that, fundamentally, legal incapacities are intended to protect individuals who, due to their age and level of maturity, cannot fend for themselves; therefore, it is necessary to protect both them and their assets.

That said, according to the Civil Code, legal incapacities can be absolute, relative, or special. (National Congress, 2005) .

Absolute legal incapacity refers to a situation in which acts and contracts entered into by persons deemed to be in this category have no legal effect whatsoever; there is no possibility of remedying or validating this incapacity.

According to the Ecuadorian Civil Code, persons with mental disorders, minors, and deaf-mute individuals who cannot make themselves understood in writing are deemed absolutely legally incapacitated. (National Congress, 2005) .

Along these same lines, the Civil Code establishes a second category of legal incapacity: relative legal incapacity. Unlike the first classification, acts or contracts entered into by individuals with relative legal incapacity do not result in absolute nullity; rather, as the name implies, their incapacity is relative and can therefore be remedied or validated; and a third classification is special or particular legal incapacity, which essentially means that a legally capable person may lack capacity for certain acts or contracts; for example, a guardian lacks the capacity to purchase property for a ward, among other cases.

Based on the above, one might conclude as a preliminary observation that, under Ecuadorian positive law, nature lacks legal capacity. However, to proceed with this study and achieve the stated objectives, it is necessary to review the concept of "nature" in Roman law in order to ultimately determine whether nature is, in fact, a subject of rights and thus possesses legal capacity.

Historical Evolution of the Term "Nature"

As noted in the first part of this article, it is important to establish that "nature," as it is currently conceived, was not explicitly defined in Roman law. Nevertheless, based on the foregoing, we will analyze the concepts most closely related to it, as well as examine the legal capacity as it was understood at that time, in order to fulfill the objectives set forth in this paper.

It is necessary to start from the premise that Roman law was based on the *Corpus Iuris Civilis*, a work compiled by Emperor Justinian between the years 527 and 565; it could be said that this work sought to establish a written legal code of the various norms existing in the Roman Empire. (Schulz, 1953)

This body of law consists of four major parts, namely: the *Codex Justinianus*, also known as the *Codex*, which primarily addresses issues related to ecclesiastical matters. Second is the *Digest*, which today could be likened to legal doctrine as it is currently understood that is, the opinions of leading authors on various substantive and procedural legal institutions. The *Digest* contained the opinions of prominent Roman jurists, which served as a source for litigants. *

Third, there are the *Institutiones*, which are conceived as a manual for students of Roman law; they define the concepts of the principal legal institutions existing at that time; and, finally, the *Novellae* (novels), which contained the edicts issued by Emperor Justinian. If this resembles current legislation, we could say that it constitutes case law, encompassing both ordinary and constitutional justice. (Vinnius, 1665)

Taking into account the topic to be addressed in this paper, the study will focus specifically on the title of the Digest and the Institutes.

Regarding the concept of "nature" in Roman law, as found in the Corpus Iuris Civilis, the term itself is not explicitly used; rather, the word *natura* is employed. Upon examining what was meant by this term, it becomes clear that there were countless conceptualizations attributed to it; however, this should not be viewed as a potential contradiction, but rather as a reflection of how the various jurists of that era contemplated, analyzed, and proposed solutions to the problems that might arise.

Taking the above into consideration, it could be argued that the term *natura* could be understood as reason, as well as a synonym for justice and equity; it could also refer to nature associated with animal instinct or human reason, depending on the philosopher addressing the concept. Next, we will analyze each of the possible definitions given to nature, also known as *natura*.

First, there is the conception that nature is related to justice and equity. This idea did not arise directly from the Romans but rather from the Greeks, who asserted that universal laws existed but that justice was eminently natural. Under this framework, the Stoics maintained that there was a deity who governed reason and who, in turn, governed the universe. Given this possibility, a universal law emerged, which could be understood as the law of cause and effect. Given this, it was suggested that human beings should "*secundum naturam* vivere" that is, live in accordance with nature. For these Greek philosophers, nature was understood to be synonymous with reason, leading to the conception that nature was nothing other than the behavior and norms that governed it. (Román, 2012)

In light of the above, it was initially assumed that nature was not associated with biological phenomena, but rather with virtue and reason.

Later, the Roman thinker Marcus Tullius Cicero continued the study of nature, placing greater emphasis on the concept of nature as conceived by the Stoics, to argue that this reason which acts in accordance with nature must be considered constant and eternal, since it cannot be altered or abrogated. Cicero states that we are not born for ourselves alone: "non nobis solum nati sumus"; therefore, when reference is made to the existence of a natural law, it is one that stems from right reason, which stands above any man-made legislation.

A third way of understanding nature in Roman law was what became known as *Ius Naturale* (Natural Law). One must start from the premise of the existence of this * * Natural Law. In Rome, law was conceived from three perspectives: *Ius Civile*, *Ius Gentium*, and *Ius Naturale*. The first has already been mentioned above, and the other two will be outlined below as they are relevant to the subject of this paper. (Pérez M., n.d.)

In Roman law, Ius Naturale, or Natural Law, was hierarchically superior to Ius Civile and Ius Gentium; it was conceived as justice in its most idealized form. Natural Law was understood to be "id quod Semper aequum ac bonum est" (that which is always equitable and good).

When referring to Natural Law in Rome, it is associated with instinct but also with reason; that is, it was viewed from both a biological perspective and a human perspective. In other words, to understand Natural Law, one had to start from a framework of animal instincts and progress to human reason.

Natural Law should be analyzed not as a separate or foreign set of norms, but rather as a set of norms interconnected with the other two branches of law; therefore, it could be conceptualized as a set of norms that govern natural persons with regard to their capacity to act and think. Therefore, Natural Law is a higher order than Civil Law; these are norms that may be obeyed or disobeyed they are not a human creation, but rather embody justice and equity.

It is worth noting that nature also served to determine what became known as ius gentium, which was the body of norms that regulated commercial relations between Romans and foreigners; since the institutions of civil law were applicable only to those considered Roman citizens.

Under ius gentium, it was understood that nature was linked to reason and its capacity to comprehend the relationship between the cosmos and human relations, thereby enabling the establishment of principles of justice and equity applicable to all citizens regardless of their nationality or citizenship. (Musso, 2021)

The existence of Ius Gentium, as detailed above, arose from commercial practices between Romans and foreigners (peregrini), provided that such trade took place in Rome. It is important to note that Ius Civile (Civil Law) was inapplicable because it was very rigid, exclusive, and specific to Roman citizens.

In contrast, the Ius Gentium was more oriented toward equity and good faith; in this vein, it regulated matters such as sales contracts, lease agreements, partnerships, as well as everything related to slavery to name a few institutions that existed at that time laying the foundations for the future, with the exception of slavery, which is no longer applicable since it has been universally and expressly abolished.

Continuing with the analysis of nature in Roman law, Gaius's contributions on this subject deserve special mention. For this Roman jurist, nature was nothing other than common sense but not just any common sense, rather one of a legal nature. For Gaius, Ius Naturale and Ius Gentium are very similar and are even intrinsically linked.

For his part, Domitius Ulpianus, in the Digest, states that it is nature that has determined the behavior of animals. Ulpianus distinguishes between the order that exists among living beings which stems from nature and the order of human behavior. Unlike Gaius, this Roman jurist held that Ius Naturale and Ius Gentium are distinct: the former applies exclusively to animals, while the latter applies to humans. At that time, this view sought to establish the legitimacy and legality of slavery ( ); thus, although, in the name of justice and equity, no one could be subjected to it, Ius Gentium did provide a basis for its existence and regulation.

Building on this study, the jurist Julio Paulo posited that Ius Naturale is nothing other than what is good and equitable. In other words, he no longer debated what earlier legal scholars had determined but rather asserted that Ius Naturale is closely related to equity; thus, he concluded that this Natural Law is based on an abstract principle.

Consequently, when reference was made to Natural Law, it was understood to be a source for the jurist's work to adapt a rule to the demands of equity in every circumstance and thus, this conception of Natural Law is related to conflict resolution and the practice of law.

It can therefore be stated that, when referring to the term "nature," it must be understood that it relates to the objective being pursued, which can be summarized as follows:

For Cicero, nature serves to underpin the political order, while for Gaius, nature is a tool for achieving the unification of law in Rome; for his part, Ulpian considered that nature and Natural Law served to resolve internal contradictions; and finally, Paulus determined that the purpose of nature was to correct injustices.

To understand this, we will examine two examples of how institutions were understood in Rome from the perspective of nature and natural reason: first, an analysis of slavery, and second, an analysis of the family.

With regard to slavery, it is imperative to note that in Roman times, slavery was recognized and was a common part of daily life among Roman citizens. However, given the broad concepts regarding nature, this institution presented a contradiction within the legal system.

The potential antinomy regarding slavery in Rome was resolved by reconciling the various concepts of nature as follows: While it is true that slavery would be contrary to nature since, in principle, all men are free it is no less true that it arises from the Ius Gentium, through which one person becomes part of another's property. Therefore, slavery was recognized as an economic relationship between Roman citizens.

In addition to this understanding, a slave was not considered a citizen but rather an object of law, lacking the freedom to act according to his own reason. Despite this, it is worth noting that while a slave lacked legal capacity, he could nevertheless be bound by natural law that is, he could, for example, acknowledge a payment he had made toward a debt.

Another example that helps us understand how different concepts of nature were handled in the Roman legal system is the legal institution of the family.

In Rome, this legal institution was understood from two perspectives: first, through a civil parental bond that is, when individuals were under the care and protection of the paterfamilias, regardless of blood ties; this is known as an agnatic bond or kinship. Second, there is the blood tie, which stems from nature and the ius naturalis.

The issue of kinship became of utmost importance, especially in matters of inheritance, since, according to the Ius Civilis, only citizens with an agnatic bond could inherit; however, over time, the cognatic or consanguineous bond prevailed, precisely based on the criteria of natural law.

Based on the details provided above, it is clear that in Roman law, although "nature" had various meanings, this was not the result of confusion, nor did it involve contradictions; rather, each conceptualization served a specific purpose.

Finally, it is crucial to note that in Roman law, animals, plants, and what we now recognize as nature were referred to as "res" and were part of the paterfamilias's estate; they were considered objects of obligations.

Understanding nature today is a complex issue, especially considering that, since the adoption of the Constitution of the Republic of Ecuador in 2008, nature has been granted the status of a subject of rights. (Constituent Assembly, 1998)

If we begin with Roman law and the entire historical evolution outlined in the previous chapter, we arrive at the conclusion that nature was viewed as a tool for understanding the Roman legal system, as were its components animals and plants which were regarded as objects of

commerce. Therefore, there is no doubt that in Roman law there was no basis for the idea that nature could be a subject of rights.

But as is well known, the law evolves, and with it, its legal institutions among which nature itself is found, which is the genesis of this research paper.

Continuing with the historical analysis of nature, in the Modern Age, Immanuel Kant drawing on the theories of Roman law reached the conclusion that nature is nothing more than a tool for human beings to achieve their ends, such as food and subsistence, to give specific examples; therefore, based on these arguments, nature cannot be considered a subject of rights.

In more recent years, to determine whether nature can be considered a subject of rights, it is necessary to analyze the theory of subjective rights, which held that only human beings are capable of demanding the enforcement of their rights; therefore, from this perspective, it is also invalid to acknowledge nature as a subject of rights. (Ferrajoli, 2001)

Similarly, it must be established that for someone to be considered a subject of rights, they must possess legal capacity a quality that nature lacks.

However, it is now well known that, as the law evolves, other perspectives on the concept of legal capacity as it has traditionally been conceived are also being adopted.

Today, it must be understood that the term "status" or "holders of rights" encompasses not only human beings but also nature. It has been concluded that nature is not merely a means to human ends but also has its own objectives and purpose, which is preservation, conservation, and reproduction.

In our country, the Constitution of the Republic of Ecuador granted "Nature" the status of a legal subject and a relative legal capacity, as will be explained below:

Although Ecuador has recognized nature as a subject of rights since 2008, this is not an initiative unique to this country, since on June 16, 1972, the Stockholm Declaration on the Human Environment was adopted, which addresses how human beings have failed to recognize their capacity to care for nature and how they can destroy it. (Stockholm Declaration on the Human Environment, 1972) .

In 1992, another international treaty known as the Rio Declaration on Environment and Development was adopted, which calls for the harmonization of human life and nature in a healthy and productive manner. (Rio Declaration on Environment and Development, 1992)

It must be made clear that Ecuador was the first country to recognize that nature has rights distinct from those of human beings, since, prior to 2008, an anthropocentric view of nature prevailed that is, its protection, conservation, and care were conditioned on human needs for it, rather than on the mere fact that it is nature.

It should also be noted that the fact that nature is a subject of rights is a purely constitutional matter, which has also been established in the procedural sphere, as provided for in Article 30 of the General Organic Code of Procedures, which identifies nature as a party to legal proceedings; as well as in Article 31, which grants it procedural capacity; and finally, Articles 38 through 40 specify how nature is represented. (National Assembly, 2015)

This is why it is noted that nature has a limited or relative legal capacity; since, according to the Constitution, by defining nature as a subject of rights, these rights are specifically three: respect, guarantee, and protection; and its legal capacity to claim these rights will be exclusively as a

legitimate claimant. Therefore, this is precisely why it is stated that nature has a relative legal capacity, limited exclusively to demanding and guaranteeing the rights listed above.

To conclude this discussion, it is necessary to clarify what the Constitutional Court of Ecuador understands by "nature":

> "Nature consists of an interrelated, interdependent, and indivisible set of biotic and abiotic elements (ecosystems). Nature is a community of life. All the elements that comprise it, including the human species, are interconnected and have a function or role. The properties of each element arise from its interrelationships with the other elements and function as a network. When one element is affected, the functioning of the system is altered. When the system changes, it also affects each of its elements." (The Rights of Mangroves and the Intensive Extractive Activities That Threaten Them, 2021) . Therefore, the Constitutional Court has stated that nature itself, as well as mangroves, rivers, forests, and animals, are subjects of rights. (Constitutional Court of Ecuador, 2023)

Taking all of the above into consideration, it can be stated that, in Western law, nature has been conceived as a reservoir of resources necessary for human survival. It is based on the assumption that the environment is the property of humans, to be exploited and consumed. Despite this, this purely anthropocentric view has shifted significantly due to climate change and the possibility that nature may indeed deteriorate to such an extent that it can no longer sustain human life.

And it is precisely because of this shift in perspective that the legal relationship between humans and nature has taken a new turn, giving rise to the ecocentric view, in which nature is recognized as a subject of rights and, consequently, is granted rights.

With this new perspective, the goal is not only to safeguard human beings and their right to live in a healthy environment but also to ensure that nature's right to exist, to be preserved, and to be restored when damaged is respected thereby enabling both subjects of rights to coexist.

Moreover, this has not merely been conceived as an idea or theory but has already become a reality through constitutional, legal, and jurisprudential frameworks in various countries around the world, with Ecuador being one of the pioneers alongside Bolivia, New Zealand, India, and Colombia.

Delving a little deeper into the contemporary aspect of these new conceptualizations of nature, it is necessary to mention some authors who have developed an ecocentric view of nature. First and foremost is Christopher Stone, who, in his work *Should Trees Have Standing?*, developed an interesting analysis of the law's obligation to evolve within the procedural framework. In his work, he notes that procedural law, through case law, has granted standing to vulnerable entities, and that nature should be included in this category. (Gudynas, 2011)

Continuing with the analysis outlined above, it is important to note that, alongside the idea of nature as a subject of rights specifically in Ecuador a new concept known as "Buen Vivir" (sumak kawsay in Quechua) has taken root. This concept posits that humanity and nature are intertwined, each being part of the other and vice versa. (Kauffman, C. M., & Martin, P. L., 2018)

Along with this new definition of Buen Vivir, the figure of Pachamama has reemerged, defined not as an abstract category but as the very place where the existence of every living being unfolds and is sustained. (Stone, 1972)

Indeed, building on these new theories, the Constitution of the Republic of Ecuador, adopted by the Constituent Assembly in 2008, is the first constitutional legal instrument in the world to establish and develop the rights of nature and grant it the status of a rights-bearing subject. Articles 71 through 74 stipulate that nature must be respected, protected, and restored in the event that it is affected by human activity during its life cycle. (Acosta, 2010)

In addition to the above, as of the year in question that is, 2008 it was constitutionally established in Ecuador that nature, as a subject of rights, is also entitled to assert its rights, thereby being granted standing to sue to demand that its rights be respected; any natural or legal person, community, or nationality may exercise this standing; furthermore, the burden of proof is reversed, meaning that it is not necessary to demonstrate that the harm to nature affects the party filing the lawsuit. (Acosta, 2010)

Another regulatory milestone occurred in New Zealand with the passage of the *Te Awa Tupua Act* in 2017, which granted legal personhood to the Whanganui River. (Under this law, shared standing is granted to representatives of the Māori people and the national government, who are empowered to demand respect for the aforementioned river.

Returning to Latin America, in Colombia, the Supreme Court of Justice ruled that the Amazon region within that country is to be considered a subject of rights, as set forth in Ruling No. STC4360-2018. The court's reasoning for this decision highlighted the need to prevent the degradation of the Amazon, as well as humanity's obligation to protect nature and prevent its devastation. These three examples constitutional, legal, and jurisprudential indicate that, in each country, nature is recognized as a subject of rights, but not in a rigid or standardized manner; rather, this recognition is tailored to the specific needs of each country.

By examining the cases outlined above, it can be concluded that nature is indeed assuming a prominent role in current legal regulations, specifically with regard to ensuring respect for nature; however, it is important to explore a new aspect of this research that relates to the aforementioned findings, namely the form of representation in legal proceedings.

Traditionally, as discussed earlier, standing in legal proceedings through representation is the most commonly used approach. (Boyd, 2017) However, this approach presents a practical difficulty: determining whether the party representing nature is acting on its behalf or whether they are actually pursuing their own interests whether private, economic, or political that run counter to the rights of nature. (Daly, 2012) To address this issue, several countries have opted to establish mixed guardianship committees, as is the case in New Zealand, for example. (Kauffman, C. M., & Martin, P. L., 2018)

These issues continue to evolve today, with broad representation and the role of guardians to represent nature within the ordinary justice system.

Finally, it is worth noting that the rights of nature have contributed to a contemporary debate that goes hand in hand with the effects of climate change, given that everything previously conceived regarding nature namely, that it served only as a tool for human subsistence no longer has a place in current legislation.

Conclusions

To understand a substantive or procedural legal institution in Ecuador, one must look back to Roman law, since our legislation stems from that legal tradition. Nature, as a concept as

discussed above is complex and cannot be easily defined; rather, it has been a dynamic institution that has evolved in accordance with the times and the needs of each era.

Until a few years ago specifically before 2008 it was very difficult to even conceive of nature as a subject of rights; there was no doubt whatsoever that, when nature was mentioned, it was assumed to be an object of law, and there was little room for further discussion on the matter. (Martínez, 2019) . However, it is essential to examine historically as has been done above how nature was conceived in Justinian's Roman law, leading up to its constitutional recognition as a subject of rights.

Based on the analysis, it can be stated that, in the Codex Iuris Civilis, the concept of nature was analyzed from a biological perspective, as well as in relation to the universe or the cosmos; that is, nature was viewed as everything that formed part of the world, including human beings. Along these same lines, nature came to be conceived later as a deity that had to be honored and obeyed; it is precisely at this point that the theory of Natural Law emerges the law that derives from nature's own rules.

This led to a third period, in which it was determined that Nature and Justice are intrinsically linked, since the ideal of nature was Justice. It must be made clear that, in Roman law, nature was conceived as an argumentative tool in legal reasoning; therefore, it is erroneous to think that there was any confusion or contradiction between the different ways of conceiving nature. Rather, in Rome, the approach involved adapting the understanding of nature to resolve the theoretical and legal problems that might arise both among Roman citizens and in their commercial relations with foreigners within their own territory.

Therefore, nature and what was conceived as Natural Law in Rome were nothing more than a concept that depended on the objective being pursued, and this was its greatest strength. As can be seen, it is entirely different from what is defined today as nature which is understood, in very general terms, as everything that forms part of the biosphere. To conceptualize this, the biosphere is understood as the place where life exists; it is "the home of all living organisms." (Huggett, 1999)

Ecuador has been a pioneer in establishing that nature is a subject of rights and not an object. On this point, it is important to note that this constitutional movement to grant rights to nature has been classified as one of the main challenges and milestones in the debate, given that recognizing nature as a subject of rights gave rise to new theories regarding what was previously conceived as the subject of rights a concept that, prior to 2008, was attributed solely to human beings, as it was inextricably linked to legal personality. (Viciano, 2019)

This has sparked an academic, doctrinal, and constitutional debate, given that nature as determined by the Constitution of the Republic of Ecuador and the Constitutional Court has three enforceable rights: respect, preservation, and guarantee. This falls short of the possibility of being a subject of rights in the general sense; since a subject of rights (a human being) can not only claim rights but also assume obligations a situation that nature cannot assume. (Crespo, 2009)

By virtue of this, when referring to nature as a subject of rights, it is necessary to take into consideration that this is a new way of conceptualizing a subject of rights, which would be limited to three aspects, namely: respect, preservation, and guarantee. Nature does not have the option of assuming any kind of obligation. (Bustamante, 2022)

In this regard, the Constitutional Court has ruled that nature has the right to exist and to have its life cycles respected without being affected by human activity; and that, should such activity cause damage or harm regardless of its origin or causes it is the State's obligation to remedy and restore the damage, as well as to ensure that nature is not harmed again. (The Monjas River, 2022)

In order to exercise these rights, it has been determined that for nature to exercise its rights respect, preservation, and guarantee it shall have active legal and procedural capacity; legal actions may be filed on its behalf by any natural or legal person, as well as by a community or by the Ombudsman. (National Assembly, 2015)

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University Governance and the Management of Intercultural Teaching in the Law Program at the Bolivarian University of Ecuador: A Proposal for Institutional Policy

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Introduction

Latin American universities face a dual challenge: they must respond effectively to culturally diverse societies and, at the same time, reform their governance to ensure quality, equity, international standing, and social relevance. In Ecuador, this challenge is explicitly grounded in the 2008 Constitution (Constituent Assembly, 2008), which defines the country as an intercultural and plurinational state (Art. 1), assigns to higher education the purpose of disseminating knowledge and cultures (Art. 350), recognizes twenty-one collective rights of communes, communities, peoples, and nationalities (Art. 57), and grants jurisdictional functions to indigenous authorities based on their own laws (Art. 171).

In the law program, interculturalism ceases to be merely an educational value and becomes a professional competency. A lawyer practicing in Ecuador may represent clients before indigenous authorities, litigate in prior consultation proceedings, or defend a person charged with cultural practices not covered by ordinary criminal law. Santos and Grijalva (2012) document that coordination between indigenous justice and ordinary justice is one of the most contentious issues in the plurinational project.

The law program at the Bolivarian University of Ecuador (UBE) faces a fundamental contradiction. On the one hand, the constitutional mandate recognizes legal pluralism and interculturalism as principles of the plurinational state (Constituent Assembly, 2008, arts. 1 and 171). On the other hand, a pedagogical and university management model persists that reproduces monocentric, Eurocentric, and monist structures in the training of legal professionals. In theoretical terms, this contradiction manifests as the gap between the formal recognition of the coexistence of diverse legal systems state, indigenous, and customary within the same social sphere (Tamanaha, 2021) and the absence of institutional, curricular, and pedagogical mechanisms that integrate legal pluralism as an academic category and as a cross-cutting pillar of university governance.

This contradiction is particularly acute at UBE because it is an institution committed to social transformation and the inclusion of historically excluded sectors. Its graduates must respond to the demands for justice from indigenous peoples and nationalities, Afro-descendant communities, and other actors operating under their own normative systems. However, the starting point of this study is that the curricular structure, teaching methodologies, and mechanisms for managing instruction remain, to a large extent, anchored in positivist and legalist paradigms that render colonial difference invisible (Mignolo, 2000) and may reproduce the epistemic racism that subordinates ancestral legal knowledge to state law.

This gives rise to the research question: How can university governance and the management of intercultural teaching in the UBE's law program be structured so that they integrate legal pluralism, custom as a source of law, and decolonial pedagogy; develop intercultural competencies in future lawyers; and ensure the social relevance of legal education in the plurinational state of Ecuador? Consequently, the general objective is to design a proposal for an institutional policy on governance and the management of intercultural teaching at the UBE with priority application to the law program that integrates legal pluralism as a pedagogical category, custom as a source of law in plurinational contexts, and decolonial pedagogy as an educational approach. To this end, three research questions are posed: (Q1) What models, practices, and tensions does the literature on university governance and intercultural teaching report?; (P2) What mandates does the Ecuadorian regulatory framework establish, and to what extent are they translated into institutional management?; and (P3) How do the program's administrators and external informants linked to intercultural justice perceive the integration of interculturality into the program's governance, curriculum, and teaching?

The results are organized according to the logic of the methodological design. First, we present a summary of the selection process and the thematic categories of the systematic literature review (SLR), which constitutes the theoretical and empirical basis of this article. Next, we report the findings of the documentary-normative analysis of the Ecuadorian framework and those from the semi-structured interviews. The convergence of these three sources of evidence, integrated through triangulation (Denzin, 1978; Flick, 2018), supports the institutional policy proposal for the Bolivarian University of Ecuador (UBE) and its implementation roadmap.

Selection Process and Thematic Categories of the Systematic Review

Application of the PRISMA 2020 statement (Page et al., 2021) allowed for the identification of 202 records in the databases consulted: Scopus (n = 73), Web of Science (n = 51), SciELO (n = 42), and Redalyc (n = 36). After removing duplicates (n = 28), 174 records were screened based on title and abstract, of which 120 were excluded for failing to meet the eligibility criteria. The remaining 54 reports were retrieved and evaluated in full text according to the eligibility criteria; 35 were excluded: 22 for failing to meet the thematic relevance threshold in at least one of the three areas, 9 for lacking explicit empirical or theoretical support, and 4 because they were opinion pieces without an identifiable methodological foundation. The remaining 19 studies, published between 1999 and 2024, constitute the analyzed corpus.

The geographic distribution of the corpus reflects the prominence of the Ecuadorian case: nine studies address experiences in Ecuador in particular, Amawtay Wasi University one focuses on Mexico, one on Colombia, and two offer regional or comparative Latin American perspectives. The remaining six analyze university governance from an international comparative perspective (n = 2) or from contexts in Europe (n = 2), Lebanon (n = 1), and the post-Soviet countries (n = 1). In terms of design, qualitative case studies and theoretical and documentary analyses predominate, which is consistent with the interpretive-critical nature of the field. Table 2 summarizes the characteristics of the included studies.

Inductive-deductive thematic coding (Braun and Clarke, 2006; Saldaña, 2021) yielded three a priori categories and two emergent categories. The a priori categories university governance frameworks and interculturality, approaches and models of intercultural teaching n Latin America, and the state of interculturality in Ecuadorian higher education articulate the synthesis of the RSL. The two emergent categories tension between quality standards and cultural relevance,

and institutional factors of success and failure in intercultural implementation cut across the three a priori categories and are discussed in greater detail in the discussion section.

The first a priori category is "university governance and interculturality." University governance can be defined as the set of formal and informal structures, processes, and mechanisms through which decisions are made, authority is distributed, and accountability is ensured in a higher education institution (van Vught and de Boer, 2015). The synthesis of the studies included in the RSL shows that there is no single model of university governance; rather, the literature identifies a diversity of institutional configurations that vary according to national context, type of institution, and organizational mission (de Boer and Denters, 1999). This contingent nature has direct implications for the design of intercultural policies: a governance model that works in one context may prove inappropriate and even counterproductive in another.

The review identifies three models of university governance: the collegial model, based on academic authority and peer deliberation; the bureaucratic-managerial model, which emphasizes administrative efficiency and accountability mechanisms; and the participatory-democratic model, which incorporates external actors communities, civil society organizations, student representatives into institutional decision-making bodies. Studies on governance in Europe and Lebanon agree that there is no single ideal model valid for all institutions; therefore, governance must be tailored to the mission and context of each institution (Bengoetxea Castro, 2012), and that quality assurance must examine not only standards but also leadership practices and institutional governance (Abou Chahine and Damaj, 2020). In the Latin American context, the reviewed studies agree that the universities that have made the most progress in incorporating interculturality have adopted elements of the participatory model, particularly through advisory bodies with genuine community participation (Dietz and Mateos Cortés, 2011; Guilherme and Dietz, 2017).

Thus, Guilherme and Dietz (2017) argue that diversity in higher education cannot be reduced to a matter of representation or visibility: it ultimately implies a reconfiguration of the epistemic structures that determine what is considered valid knowledge within the institution. This perspective is similar to that of Eckel (2023), who, based on a study of university governance in fifteen post-Soviet countries, notes that no single governance model works for all contexts and that the core of institutional change lies in the ability to transform the mindsets of stakeholders, beyond formal structures. The axial coding of the corpus confirms this diagnosis: in most of the cases of successful integration of interculturality analyzed, the transformation of governance preceded or accompanied curricular and pedagogical changes.

The second a priori category is intercultural teaching, which in Latin American higher education has been conceptualized from diverse perspectives. Most of the studies reviewed were conducted at newly established intercultural universities; however, their findings are transferable with the necessary adjustments to conventional universities seeking to incorporate interculturalism into their pedagogical model. This transferability underpins the approach of intercultural mainstreaming: it is not necessary to build a new institution to implement teaching that is more culturally relevant and equitable.

From this perspective, Dietz and Mateos Cortés (2011), based on their study of the Universidad Veracruzana Intercultural in Mexico, document a model that combines conventional university education with community-oriented research, territorial engagement projects, and intercultural knowledge management. This model is committed to training professionals who act as cultural mediators in their communities of origin, linking academic knowledge with local and ancestral

knowledge. The centrality of the community-university relationship is not merely symbolic: in the documented cases, the legitimacy of the intercultural process depends on the community recognizing it as its own, not as an institutional imposition.

At this point in the debate, Guzmán-Valenzuela (2021), based on a review of 40 studies by scholars from Latin American universities, identifies decolonizing curricular and pedagogical practices at the macro, meso, and micro levels centered on indigenous intercultural education and proposes six criteria for decolonizing the university: cultural, epistemological, relational, ecological, economic, and political. Coding of the corpus shows that these dimensions appear, with varying degrees of emphasis, in a significant portion of the reviewed studies, suggesting that they represent an emerging consensus in the field.

In the pedagogical realm of curriculum decolonization, the work of Villagómez Rodríguez (2018) stands out; it describes the experience of the Bilingual Intercultural Education program at the Universidad Politécnica Salesiana in Ecuador as an example of "alternative pedagogies" that integrate the Andean worldview, indigenous languages, and community-based life projects into the university curriculum. Rivera Mateos et al. (2017) document the case of the Pedagogy of Mother Earth at the University of Antioquia (Colombia), which integrates indigenous knowledge, ecological wisdom, and critical pedagogies into an intercultural teacher-training program. In both cases, the distinguishing factor is not the content of the programs themselves, but rather the pedagogical architecture that underpins them: an architecture built from within the community rather than designed for it from above.

Fernandes (2014) analyzes experiences of intercultural collaboration in higher education across four countries (Argentina, Brazil, Colombia, and Peru), identifying that the main conflicts arise in the methodological negotiation between conventional academic logics and community rationalities, and that the key to success lies in culturally adapted selection, induction, and evaluation processes. Krainer et al. (2017) emphasize that the dialogue of knowledges is not merely a methodological strategy, but an ethical and political stance that involves recognizing the equal epistemological dignity of different knowledge systems. This distinction between dialogue as a technique and dialogue as a stance underlies the emerging tension between quality standards and cultural relevance.

The corpus analysis identifies four pedagogical strategies that recur in the literature on quality intercultural teaching in Latin American higher education: community-based learning, which links educational processes to development projects in students' communities of origin; bilingual and intercultural teaching, which incorporates indigenous languages as vehicles for the production and transmission of knowledge; participatory action research, which transforms students into agents of social change in their territories; and seedbeds of ancestral knowledge, which recover and systematize traditional knowledge in dialogue with academic knowledge. The effective implementation of these strategies requires an institutional policy that provides them with regulatory framework, resources, and curricular recognition (Guilherme and Dietz, 2017; Rivera Mateos et al., 2017; Villagómez Rodríguez, 2018).

Regulatory Framework and Interculturality in Ecuadorian Higher Education

A hermeneutic-critical analysis (Ricoeur, 1995; Bowen, 2009) of Ecuador's regulatory framework reveals a consistent gap between the ambition of constitutional mandates and the effectiveness of their implementation in institutions of higher education. Ecuador has one of the most advanced constitutional frameworks in Latin America regarding interculturalism and collective

rights: the 2008 Constitution recognizes the State as plurinational and intercultural, guarantees the Intercultural Bilingual Education System (SEIB) (Art. 347, para. 9), and establishes the obligation for the higher education system to incorporate the knowledge and wisdom of the country's diverse cultures. The Higher Education Law (LOES), which enshrines the principle of relevance (Art. 107), and the CES Academic Regulations reinforce this mandate by establishing criteria for cultural relevance in curriculum planning. However, an examination of CACES reports and the mission statements of conventional universities reveals that the effective implementation of these mandates has been uneven and fragmented: interculturalism appears in mission and vision statements, but rarely translates into explicit academic evaluation criteria or governance mechanisms involving genuine community participation.

The case of the Amawtay Wasi Intercultural University of Nationalities and Indigenous Peoples represents the most important lesson offered by the Ecuadorian documentary analysis. Founded in 2004 as the country's most ambitious experiment in intercultural higher education, its operations were suspended in 2013 following an evaluation process by the then-CEAACES, whose criteria did not incorporate the principles of intercultural education (Drouin-Gagné, 2016; Martín-Díaz, 2017; Guamán-Eras and Tenutto-Soldevilla, 2024). The 2018 reform of the LOES reestablished it as a public university, and it currently operates with its own academic programs (Guamán-Eras and Tenutto-Soldevilla, 2024). This trajectory suspension and subsequent reinstitutionalization does not invalidate the intercultural project; on the contrary, it highlights that its sustainability depends on the system's evaluation and governance frameworks being culturally relevant, which reinforces the need to incorporate interculturality within conventional universities as well.

The history of Amawtay Wasi contains a paradox: created as an alternative to the conventional system, it ended up being evaluated using the same criteria as that system (Drouin-Gagné, 2016), which Sarango Macas (2019) describes as a project trapped in the coloniality of power. This paradox suggests that decolonization cannot be limited to creating parallel institutions but also requires transforming conventional institutions from within, incorporating the recognition of epistemological diversity into their governance and evaluation frameworks. A hermeneutic-critical reading of Ecuador's regulatory trajectory is consistent with this interpretation: the 2025–2029 National Development Plan and the most recent CACES reports identify cultural relevance as one of the quality criteria yet to be operationalized within the system, which opens a window of political opportunity for the proposal outlined in §3.4.

Arteño Ramos et al. (2024) conducted an empirical study with educational stakeholders at Ecuadorian universities that complements the documentary analysis: although there is nominal recognition of interculturality in institutional documents, everyday teaching practices largely reproduce colonial views of knowledge. Participants identified the following as the main obstacles: a lack of teacher training in intercultural perspectives, the absence of culturally relevant teaching materials, limited community participation in curriculum development, and the lack of assessment and evaluation systems that value ancestral knowledge. Arias-Gutiérrez and Minoia (2023), in their study on decoloniality and critical interculturality in the Ecuadorian Amazon, propose that critical interculturality unlike merely functional interculturality is not limited to recognizing diversity within the existing system, but rather questions the power relations that produce and sustain it, demanding a profound reconfiguration of university governance.

The convergence of evidence from the RSL, normative analysis, and the reviewed Ecuadorian empirical studies yields a clear diagnosis: political will is expressed in the legal framework, but

the governance instruments, pedagogical resources, and faculty training necessary for that will to translate into everyday practice are lacking. This diagnosis directly guides the five pillars of the institutional proposal for the UBE.

Stakeholder Perspectives: Analysis of the Interviews

The ten interviews yielded a corpus of 65,483 words. Content analysis using open-coding and axial coding (Saldaña, 2021) in ATLAS.ti v.24 identified three major themes that encompass all the applied codes. The first theme the gap between regulatory mandates and institutional practice accounted for the largest number of coded segments and is present in the statements of the five interviewed administrators and three of the five external informants. One program director noted: "We know that the law requires us to promote interculturalism, but in practice we lack the tools and institutional spaces to translate that mandate into concrete actions within the curriculum" (D3). The recurrence of this theme in the testimonies of actors holding such diverse positions lends it consistency as a central finding of the qualitative component.

The second theme community demands for recognition and dialogue emerged primarily in the testimonies of the external informants (IE1–IE5), who represent practitioners within the ordinary justice system and authorities from municipalities and indigenous communities. Their accounts illustrate the gap between conventional legal education and the needs of those who must operate in contexts of actual legal pluralism: "The professionals who come to our communities do not understand our way of resolving conflicts; they bring their textbooks, but community justice operates on different principles, at a different pace, and according to different criteria that are not taught in any classroom" (IE2). This finding confirms and expands upon what Arias-Gutiérrez and Minoia (2023) documented in their interviews with stakeholders in the Ecuadorian Amazon.

The third theme teachers' openness to interculturality, which is influenced by their training and workload emerged as a cross-cutting theme in the testimonies of administrators and external informants, who repeatedly referred to the situation of the teaching staff, and is perhaps the most relevant for the design of institutional policy: resistance to change is not ideological in most cases, but rather the result of a lack of concrete pedagogical tools and the burden that intercultural training adds to an already heavy workload. The transcripts returned to participants during the *member-checking* process (Lincoln and Guba, 1985) confirmed the accuracy of the interpretations without prompting requests for substantive changes, which strengthens the credibility of these three themes as a faithful representation of the stakeholders' perspectives.

In summary, the triangulation of the three sources of evidence RSL, normative analysis, and interviews allows us to identify three points of convergence, one complementarity, and one productive divergence that structure the institutional policy proposal.

The points of convergence are as follows: (a) the gap between the normative mandate and everyday teaching practice is consistently recognized in the literature, in institutional documents, and in the testimonies of all stakeholder groups; (b) teacher training emerges as the most frequently cited bottleneck, both in the reviewed Latin American studies and in the testimonies of the interviewees; and (c) genuine community participation not merely consultative or symbolic is identified by the literature and by external informants as a necessary condition for the sustainability of any intercultural policy.

The most significant complementarity lies between the documentary analysis and the testimonies: while the literature and regulations allow us to identify what is required and what has been attempted in other contexts, the interviews provide an account of the processes that create the gaps and the perspective of those who experience them. The synthesis of both sources yields a more precise and actionable diagnosis than either source alone.

Productive divergence refers to the differing interpretations of the gap depending on the actors' positions: administrators attribute it primarily to a lack of institutional tools and spaces, while external informants describe a university that remains ill-equipped to operate in environments of genuine legal pluralism. This divergence does not invalidate either account; on the contrary, it suggests that interculturality is perceived differently depending on one's position within the system, and that an effective policy must incorporate mechanisms that make this gap visible and deliberately work to reduce it.

Taken together, the findings presented in this section form a consistent analysis, built upon the convergence of the stakeholders' accounts, the normative analysis, and the systematic review. The three themes identified in the interviews, interpreted in light of the convergences and productive divergence revealed by the triangulation, show that the effective incorporation of interculturalism into the program is not a matter of normative will the mandate exists and is recognized but rather a challenge related to institutional capacity, teacher training, and genuine coordination with community stakeholders. These three areas constitute, precisely, the pillars upon which the institutional policy proposal developed in the following section is built.

Proposal for an Institutional Policy for the Bolivarian University of Ecuador

Based on the triangulation presented in §3.3 and the analysis of the Ecuadorian regulatory and institutional context developed in §3.2, an institutional policy proposal is formulated below so that the UBE, as a conventional university, may systematically and sustainably incorporate elements of interculturality into its governance and teaching. The proposal is structured around five complementary pillars, each grounded in the convergence of empirical evidence, regulatory mandates, and stakeholder perspectives. It is essential to emphasize that these pillars do not imply transforming the UBE into an intercultural university, but rather the progressive integration of interculturality as a cross-cutting value within its structure and day-to-day operations.

The five cross-cutting pillars presented in this proposal are as follows:

Pillar 1: Epistemological Recognition and Transformation of Governance: The UBE must incorporate the principle of epistemological pluralism into its Institutional Charter and educational model as the foundation for the production and transmission of knowledge. In practical , this implies that governance structures the University Council, the Academic Council, and curricular units incorporate criteria of cultural relevance into their decisions, and that an advisory body the Council of Intercultural Wisdom be established to guide this process from the perspective of the culturally diverse communities present at the institution (van Vught and de Boer, 2015; Guilherme and Dietz, 2017). This body should not be viewed as merely symbolic: it must have real advisory functions in curriculum review, in evaluating the cultural relevance of programs, and in formulating protocols for supporting students from indigenous peoples and nationalities, Afro-Ecuadorians, and Montubios. The call for this type of body emerged in four of the ten testimonies gathered during the interviews, which provides direct empirical support for it.

Axis 2: Intercultural Teacher Training: The study's most consistent finding that teacher training is the primary bottleneck makes this axis the most urgent aspect of the proposal. UBE must implement a systematic policy of continuing education in interculturalism that includes modules on cultural diversity and intercultural pedagogies for practicing teachers, criteria for intercultural competence in the selection and evaluation of teacher performance, and partnerships with specialized indigenous, community, and academic organizations to design relevant materials and methodologies. This training does not replace teachers' subject-specific training but rather complements it with tools to address cultural diversity in the classroom (Arteño Ramos et al., 2024; Villagómez Rodríguez, 2018). The third theme identified in the interviews teachers' openness being conditioned by the availability of tools indicates that receptivity to change exists; what is lacking is the training opportunity to activate it.

Axis 3: Intercultural curriculum management: the UBE's university curriculum must undergo a participatory review process aimed at mainstreaming intercultural perspectives. This involves: incorporating content on the realities, knowledge, and worldviews of Ecuador's peoples and nationalities into the syllabi of all degree programs; using community-based and project-based learning methodologies with cultural relevance; and revising reading lists to include authors and perspectives from Latin American and Indigenous intellectual traditions. These changes do not require redesigning the programs from scratch, but rather making gradual and systematic adjustments within the existing curricular frameworks (Guzmán-Valenzuela, 2021; Rivera Mateos et al., 2017). In the law program, this focus is realized through the cross-cutting incorporation of legal pluralism and customary law as sources of law in courses on constitutional, criminal, and human rights law; through the study of constitutional case law on indigenous justice; and through the creation of practical learning spaces such as an intercultural legal clinic in coordination with community authorities.

Axis 4: Community Participation in Institutional Management: The legitimacy of the process of incorporating interculturalism at UBE depends on the participation of culturally diverse communities in institutional management. This involves establishing formal mechanisms for consultation and dialogue with organizations representing indigenous peoples, Afro-Ecuadorians, and Montubios within the university's area of influence; promoting enrollment, retention, and graduation among students from these groups; and developing community engagement projects that are culturally relevant and contribute to the well-being of the territories where the UBE operates. The external informants interviewed were unanimous on this point: the community wants to be a genuine partner, not a passive beneficiary of programs designed without its input (Fernandes, 2014; Arias-Gutiérrez and Minoia, 2023).

Axis 5: Culturally Relevant Evaluation: UBE's academic quality evaluation system must incorporate indicators of cultural relevance that complement standard institutional evaluation criteria. The following indicators are proposed: percentage of courses with explicit intercultural content; retention and graduation rates for students from indigenous peoples and nationalities; number of faculty members with accredited training in interculturality; and satisfaction levels among students from culturally diverse communities. The introduction of these criteria into the standard quality assurance system is the path toward ensuring that interculturality ceases to be a constitutional aspiration and becomes a measurable and improvable institutional practice (Bengoetxea Castro, 2012; Arteño Ramos et al., 2024). This pillar directly addresses the lesson from Amawtay Wasi: if quality indicators do not recognize the epistemic validity of intercultural methodologies, any intercultural project risks being judged and eventually eliminated based on criteria that do not understand its logic.

The table summarizes the five pillars, their strategic objectives, key actions, and the actors responsible for their implementation.

Table 1. *Summary of the Five Pillars of the Institutional Policy for the UBE*

Pillar	*Strategic Objective*	*Key Actions*	*Responsible Parties*
Pillar 1. Epistemological Recognition	Integrate epistemological pluralism into the governance and institutional mission of the UBE.	Statutory reform; creation of the Council on Intercultural Wisdom; incorporation of intercultural criteria into academic evaluation.	University Council; Office of the President; Academic Affairs Office.
Axis 2. Intercultural Faculty Training	Develop intercultural competencies among the UBE faculty.	Continuing education program; hiring and evaluation criteria; communities of practice; teaching materials.	Human Resources Office; Office of Pedagogical Innovation; Faculties.
Axis 3. Intercultural Curriculum Management	Transform curricula to incorporate diverse epistemological perspectives.	Participatory curriculum review; modules on ancestral knowledge; community-based learning projects; credit recognition.	Curriculum Committee; Program Coordinators; Faculty.
Axis 4. Community Participation	Involve communities and organizations in academic and institutional management.	Cooperation agreements; prior consultation; territorial engagement; targeted scholarships.	Office of Community Engagement. External partners: CONAIE and Afro-descendant and Montubio organizations.
Axis 5. Culturally Relevant Assessment	Develop a quality assessment system with culturally relevant indicators.	Diversity indicators; participatory self-evaluation; evaluation of intercultural teaching performance.	Office of Assessment and Quality; Council of Intercultural Wisdom. External partner: CACES.

Note: Prepared in-house based on van Vught and de Boer (2015), Krainer et al. (2017), Arteño Ramos et al. (2024), and Arias-Gutiérrez and Minoia (2023).

The proposed institutional policy requires a roadmap for gradual and participatory implementation that will enable UBE to make steady progress toward the institutionalization of intercultural teaching. The rationale for the three phases is based on the findings of the empirical study: given that the gap between regulatory mandates and teaching practice is wide and multidimensional, and given that resistance exists due to a lack of tools not necessarily ideological resistance the progressive accumulation of successful experiences is the most effective strategy for generating the internal consensus that the transformation requires. Table 2

summarizes these phases and the proposed indicators for monitoring the policy by strategic axis. The targets are indicative and should be adjusted based on the baseline obtained in Phase 1.

Table 2. *Implementation Phases and Monitoring Indicators for the UBE's Intercultural Policy*

Phase	Period	Key Actions	Criteria and Considerations	Monitoring Indicators (Key Area)	Goal by Year 5	Expected Outcome
Phase 1: Assessment and Institutional Awareness-Raising	Years 1–2	• Conduct a participatory assessment of cultural diversity within the university community. • Identify gaps in curricula, teaching practices, and governance structures regarding intercultural relevance. • Develop awareness-raising initiatives on the regulatory framework for interculturalism and on documented Latin American experiences.	• The goal is not to transform the institution overnight. • The priority is to build internal consensus and a knowledge base.	Baseline measurement of all indicators (Axes 1–5). **Cross-cutting:** % of students from indigenous peoples and nationalities receiving scholarships or differentiated support (baseline and start of support)	Initial progress	Internal consensus and baseline knowledge established for effective and sustained integration.
Phase 2: Progressive integration and adjustment	Years 3–4	• Implement the initial curriculum adjustments. • Begin intercultural teacher	• Begin with degree programs and departments that have the highest	**Axis 1:** % of academic programs with an explicit intercultural focus in the	≥ 80% ≥ 70% ≥ 2	Initial adjustments implemented and validated in

training. • Activate mechanisms for community participation.	concentration of students from indigenous peoples and nationalities or that are most focused on community engagement (e.g., Law, due to its connection to legal pluralism). • Document experiences, identify resistance, and adjust the tools as you go. • Avoid imposing changes that generate institutional resistance.	curriculum **Axis 2:** % of faculty members with accredited training in intercultural pedagogy **Axis 3:** Number of modules or courses with content on ancestral knowledge per faculty **Axis 4:** Number of active agreements with organizations representing indigenous peoples and nationalities **Cross-cutting:** % of students from indigenous peoples and nationalities with scholarships or	≥ 10 Progressive progress	the pilot units.

				differentiated support (progressive expansion)		
Phase 3: Consolidation, evaluation, and systematization	Year 5 and beyond	• Institutionalize the changes made. • Incorporate cultural relevance indicators into the self-assessment system. • Publicly report on progress. • Systematize the experience.	This systematization should enable other conventional universities to replicate the model by integrating interculturalism from within, without creating new institutions.	**Axis 5:** Percentage of indicators in the institutional evaluation system with an intercultural dimension **Cross-cutting:** % of students from indigenous peoples and nationalities receiving scholarships or differentiated support (consolidation) Verification of compliance with all targets.	≥ 30% ≥ 25%	UBE positions itself as a model for other Ecuadorian universities in intercultural integration.

Note: Prepared by the authors based on Bengoetxea Castro (2012) and Arteño Ramos et al. (2024).

The results of this study enable a dialogue with the literature on university governance and interculturalism from a distinct perspective: that of intercultural mainstreaming in conventional universities, as opposed to the model of creating entirely new intercultural institutions. The two categories emerging from the review the tension between quality standards and cultural relevance, and the institutional factors of success and failure guide this discussion.

The triangulation of three sources of evidence literature review, normative analysis, and interviews strengthens the robustness of the findings and allows us to distinguish between what is consistent across all sources and what emerges most strongly from a specific source. This consistency or variation across sources guides the discussion that follows.

The proposal for five pillars of institutional policy aligns with the findings of Guilherme and Dietz (2017), who argue that intercultural models from the Global South should be understood not as mere adaptations of the Western university, but as epistemic proposals that challenge the foundations of hegemonic knowledge. The incorporation of epistemological pluralism into university governance Pillar 1 responds precisely to this need by recognizing that cultural diversity is not a problem to be managed, but rather a source of enrichment for the production of knowledge.

At the same time, the emphasis on intercultural faculty training (Axis 2) is consistent with the findings of Arteño Ramos et al. (2024), who document that the main gap between normative mandates and teaching practice in Ecuadorian universities lies in the lack of preparation among faculty to manage cultural diversity in the classroom. This gap cannot be closed through curricular reforms alone; it requires a systematic, long-term policy that transforms the epistemological conceptions of university faculty.

Thus, the proposal for intercultural curriculum management (Axis 3) resonates with Guzmán-Valenzuela's (2021) reflections on the decolonization of Latin American university curricula and with the experience of the Universidad Veracruzana Intercultural (Dietz and Mateos Cortés, 2011), which demonstrates that combining academic training with community-based research and territorial development projects is one of the most decisive factors in the success of these initiatives. The case of the Pedagogy of Mother Earth in Colombia (Rivera Mateos et al., 2017) further shows that it is possible to integrate ancestral knowledge and scientific knowledge into university training programs without sacrificing academic rigor or cultural relevance. These international cases contributed to the emerging category of success and failure factors in intercultural implementation, and their contrast with the case of Amawtay Wasi provided the central argument for the *mainstreaming* strategy advocated in this article.

In this vein, the most important lesson offered by the analysis of the Ecuadorian case documented by Vargas Moreno (2014), Drouin-Gagné (2016), Martín-Díaz (2017), Sarango Macas (2019), and Guamán-Eras and Tenutto-Soldevilla (2024) is of a strategic nature: the creation of a parallel intercultural institution is not, in and of itself, sufficient to guarantee the sustainability of the intercultural project. The suspension of the Amawtay Wasi in 2013 showed that an institution of this type is vulnerable to being judged by criteria that do not recognize its own logic, and its subsequent reestablishment as a public university indicates that its viability depends on changes within the system itself. The approach proposed in this article incorporating interculturality into the structure of a conventional university such as the UBE is complementary: it operates within the system, uses its own mechanisms of legitimation (accreditation, evaluation, regulations), and, at the same time, helps transform them from within.

The participatory dimension (Axis 4) is perhaps the most challenging element of the proposal, as it involves a redistribution of power in university governance that may generate resistance among traditional academic actors. Fernandes (2014) notes that experiences of intercultural collaboration in Latin America are frequently hindered by conflicts between conventional academic logics and community rationalities. To address these conflicts, UBE must create genuine spaces for intercultural dialogue, where epistemological differences are recognized and

negotiated in an atmosphere of mutual respect, rather than simply subsumed under the dominant academic logic. This finding from the literature is consistent with the second theme identified in the interviews: the community's demand for recognition and dialogue is not merely rhetorical but reflects a real historical experience of exclusion.

This research has limitations. First, it is a single-case study with purposive sampling: with 10 interviewees, the data are sufficient to generate explanatory hypotheses and guide policy proposals, but not to generalize the findings to all conventional universities in Ecuador. Second, the study does not directly capture the voices of students or faculty; therefore, the classroom perspective is inferred from the testimonies of administrators and external informants; future work should incorporate this perspective. Third, the authors' affiliation with UBE may introduce desirability bias in the responses and in the interpretation, which we sought to mitigate by including external informants and providing the transcripts for review. Fourth, the systematic review has procedural limitations: its protocol was not registered in advance; the screening process did not include independent double-checking or an inter-rater agreement index; and the methodological quality of the included studies was not formally assessed, which may have introduced selection bias and necessitates interpreting the synthesis as exploratory. Finally, the proposal has not yet been validated by experts or the academic community; future research should expand the sample to include other institutions and validate it through participatory processes (e.g., the Delphi technique or focus groups). The scale of implementation of the five pillars also poses a practical challenge: a gradual approach is recommended, prioritizing teacher training and community participation in the short term identified as bottlenecks in the triangulation process and progressively consolidating the remaining pillars through mechanisms of continuous evaluation and adjustment. Furthermore, as long as CACES does not operationalize intercultural criteria in its accreditation instruments, the proposal for Axis 5 will remain limited to internal self-evaluation, without the external incentives that could accelerate its adoption.

In this regard, it is worth noting the implications of the proposal for the UBE's institutional identity. The Bolivarian University of Ecuador is a private, conventional institution of higher education: it has academic departments, professional degree programs, an academic credit system, and a standard assessment framework. The proposal does not seek to change that identity, but rather to enrich it: to transform the UBE into a culturally sensitive conventional university that trains competent professionals who are also committed to the country's diversity. This is, perhaps, the most effective and sustainable way to ensure that interculturalism ceases to be a constitutional aspiration and becomes an everyday practice in Ecuadorian higher education.

Finally, it is worth reflecting on the role that academic research can and should play in shaping intercultural governance policies. The studies reviewed in this article suggest that situated research conducted in dialogue with communities and from diverse epistemological perspectives produces knowledge that is more relevant and transformative than research disconnected from the reality of institutions and actors. UBE can leverage its status as a university committed to social development to become a living laboratory for research on intercultural governance, generating evidence that informs its own policies and contributes to the national and international debate (Dietz and Mateos Cortés, 2011; Arias-Gutiérrez and Minoia, 2023).

Conclusions

This article has addressed university governance and the management of intercultural teaching from a specific and distinct perspective: that of a conventional university the UBE which aims to incorporate elements of interculturality into its structure and operations without transforming itself into a newly created intercultural institution. This approach, known as intercultural mainstreaming, represents a complementary path to the creation of parallel intercultural universities, whose sustainability as demonstrated by the history of Amawtay Wasi also depends on transformations within the system itself.

The main conclusions of the study are as follows. First: interculturalism in a conventional university is not a matter of image or a declaration of principles, but rather a project of gradual institutional transformation that requires concrete policies regarding governance, curriculum, teaching, and assessment. Second: international and Latin American literature offers models, criteria, and experiences that can guide this process in conventional universities without the need to redesign them from scratch. Third: the Ecuadorian regulatory framework not only allows but also requires higher education institutions to advance the integration of interculturality. Fourth: Empirical evidence from the UBE's law program indicates that the gap stems not from a lack of regulatory will, but rather from institutional capacity, faculty training, and coordination with community stakeholders; furthermore, future lawyers require explicit training in legal pluralism and in custom as a source of law. Fifth: the history of Amawtay Wasi suggests that the sustainability of the intercultural project also requires transforming existing institutions and evaluation frameworks from within. Sixth: the five-pillar proposal formulated for UBE offers a gradual and assessable roadmap, the relevance of which must be tested during its implementation.

The proposal is not a closed model but rather a starting point for institutional dialogue. Its successful implementation will depend on the political will of UBE's leadership, the collective embrace of its principles by the university community, and the building of alliances with the communities and organizations of Ecuador's indigenous peoples and nationalities. In this sense, interculturality is not simply a policy to be implemented, but a horizon of ongoing transformation that the university must embrace as part of its identity and institutional mission.

From a forward-looking perspective, the implementation of this institutional policy would position UBE as a model of best practices in incorporating interculturality into conventional universities in Ecuador and Latin America not as an intercultural university, but as a conventional university that has been able to respond, through its own structures, to the cultural diversity of its environment. This is a potentially replicable proposal that does not require the creation of new institutions but rather the responsible transformation of existing ones.

Future lines of research should explore in greater depth: (a) the participatory validation of the proposal with stakeholders from UBE and the communities; (b) a comparative analysis of intercultural policies at other Ecuadorian universities; (c) the design and validation of assessment tools for faculty intercultural competence; and (d) the study of the effects of intercultural teaching on learning outcomes and the academic trajectories of students from indigenous peoples and nationalities. These topics constitute an urgent and relevant research agenda for higher education in Ecuador and Latin America.

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Developing Teaching Competencies in Health Sciences: Current Trends and Challenges

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Introduction

The development of teaching competencies among health sciences professionals has taken on a central role in contemporary higher education, particularly in medical education. This process involves a series of strategies, programs, and policies aimed at fostering a comprehensive teaching profile in health professionals, combining pedagogical, clinical, technological, and ethical knowledge (Bailón Mieles et al., 2025).

Recent literature emphasizes the need for faculty members capable of planning, teaching, evaluating, and leading undergraduate and graduate training processes, with adaptability to digital transformation as well as a holistic approach, always grounded in values. In this context, the pedagogical integration of digital competencies is recognized as an essential component for strengthening educational innovation and responding to the new dynamics of university teaching (Panduro-Ramírez et al., 2026).

In the scientific literature, researchers categorize teaching competencies in various ways. Authors such as Bailón Mieles (2025) identify four essential groups of specific competencies: effective teaching and communication; curriculum planning and quality assurance; promotion of research and knowledge generation; and integration with and adaptation to the digital age.

For their part, Car et al. (2025), drawing on the international DECODE consensus (digital health competencies in medical education), propose 19 digital competencies distributed across four domains, incorporating the technological dimension as a central pillar of teaching. Bhattacharya (2023) reinforces the consolidation of the Competency-Based Medical Education (CBME) model, which aligns students' expected learning outcomes with faculty performance. These advances, together with the Ibero-American reviews by Paredes Olivares et al. (2024), establish a robust framework for analyzing the subject of study.

Globally, UNESCO-IESALC (2024) acknowledges that two-thirds of countries have explicitly prioritized improving teaching competencies in higher education, with a growing trend toward leadership in Latin America and the Caribbean, where 90% of the region's countries have incorporated this objective into their national plans. However, despite these advances, UNESCO warns of a projected global shortage of 44 million teachers by 2030 (UNESCO, 2025), of which 3.2 million would be in Latin America and the Caribbean, highlighting the urgent need to professionalize the teaching role in higher education.

In the region, recent reports from PAHO estimate a shortage of 600,000 health professionals by 2030 and, under adverse scenarios, up to 2 million to achieve effective coverage (PAHO, 2022, 2025), requiring a greater number of faculty members and a higher- -quality education. In Ecuador, CACES (2024) reports that, of 22 medical programs evaluated, 21 were accredited, as

were 16 of 25 nursing programs, reinforcing the need for quality in learning environments and among faculty.

Likewise, SENESCYT identifies medicine as one of the degree programs with the highest demand for admission, which implies an expansion of student cohorts and the need for pedagogical support for health sciences faculty who assume academic roles (SENESCYT, n.d.). Richard (2025) presents a national faculty profile that organizes 83 competencies across the areas of research, teaching, outreach, and administration, with an emphasis on bioethics and local culture.

In the Ecuadorian context, medical education also faces the challenge of incorporating educational technologies geared toward social impact, thereby strengthening the preparation of professionals capable of responding to the needs of the national health system through innovative and context-specific approaches (Caicedo Quiroz & Caicedo Quiroz, 2026).

At the Andean level, the Andean Policy on Human Resources in Health (ORAS-CONHU, 2024) emphasizes vocational training and continuing education, aligning faculty development with the competencies necessary to perform with a focus on primary health care and a comprehensive approach.

There are key priority areas for intervention: digital transformation and the impact of artificial intelligence, which are redefining the competencies required of health educators (Car et al., 2025; Lawrence & Levine, 2024); the human talent gap in health care, which requires increasing enrollment quotas and postgraduate programs without compromising quality something possible only through the professionalization of teaching (OPS/PAHO, 2025; OECD & World Bank, 2023); and national and international regulatory frameworks (CACES, UNESCO-IESALC, PAHO, OECD) that raise the standards for processes in higher education and, particularly, in health education.

In Ecuador, this process also requires systematic continuing education programs that strengthen the technological, pedagogical, communicative, and research competencies of university faculty as a prerequisite for educational transformation (Revelo, 2026).

The objective of this study is to analyze the evolution and current trends in the process of developing teaching competencies among health sciences professionals, identifying conceptual frameworks, international experiences, advances in Latin America, and recent contributions in Ecuador, with the aim of providing theoretical and practical foundations to enhance the quality of university teaching and graduate programs in the health field, promoting academic excellence, equity, and contextual relevance.

The search strategy initially identified 120 articles. After applying inclusion criteria, 40 studies remained; these were then screened against exclusion criteria, resulting in a final sample of 15 articles that formed the basis of the research findings.

Regarding the origin of the 15 articles ultimately selected, a diverse representation spanning six countries is observed. The largest number of studies came from Ecuador (n = 4; 26.7%), reflecting a growing interest in the Andean region in analyzing and strengthening teaching competencies in the field of higher education in health sciences.

In second place are Mexico (n = 3; 20%) and Brazil (n = 3; 20%), countries that have made significant progress in policies for teacher professionalization and in incorporating competency-based approaches into programs in medicine, nursing, and other related fields. Meanwhile,

Spain (n = 2; 13.3%) and the United States (n = 2; 13.3%) represent academic output from contexts with well-established educational systems, where health teacher education has shifted toward innovative models based on active methodologies and performance-based assessments.

Finally, one article from Chile (n = 1; 6.7%) was included; this country has promoted curriculum reforms over the past decade aimed at competency-based learning in medical education. This overview reveals a predominance of Latin American studies (11 out of 15 articles; 73.3%), which is consistent with the growing concern among universities in the region to ensure relevant, high-quality teacher training in the field of health.

A synthesis of the studies ultimately used in this research (2020–2025) reveals a decisive shift toward competency-based education and assessment in health sciences teaching, with a predominance of Latin American countries (Ecuador, Mexico, and Brazil) and useful contrasts with more established systems (Spain, the United States). Overall, the studies converge on three main themes: curricular reconfiguration under CBME; professionalization of the teaching role (medical education units, competency profiles, and professional development); and authentic competency assessment supported by digital transformations (teachers' digital competence, digital management models, and the emerging use of AI). This convergence is consistent with international quality assurance movements but highlights disparities in institutional capacities, assessment tools, and academic working conditions.

The following established trends were identified:

- Objective-based curriculum with formative assessment
  Brazil and Spain offer residency and specialized training programs that are shifting from time-based/rotation-based approaches to demonstrable achievements using rubrics and direct observation (DOPS). Studies highlight the benefits of situated learning, critical thinking, and greater alignment between learning outcomes and clinical performance. The lesson for the region is clear: without valid and continuous assessment, the discourse on competencies remains merely declarative, as assessment must demonstrate observable clinical competencies and outcomes related to patient care (Schumacher et al., 2024).
- The institutionalization of faculty development was evident in the Spanish articles, which underscore the role of Medical Education Units as "pedagogical infrastructure" that integrates training, innovation, and faculty evaluation. In Latin America, studies from Ecuador and Mexico point in the same direction, albeit with greater heterogeneity: there is a growing need for explicit faculty competency frameworks, progression pathways (novice–expert), and opportunities for systematic training (certificate programs, communities of practice, and curriculum advising). This transition also requires permanent institutional structures, academic leadership, and scalable implementation processes that ensure the sustainability of competency-based education (Karpinski et al., 2024).
- Teachers' digital competence and the use of platforms for academic management and tutoring emerge as cross-cutting themes. While digitization facilitates traceability and consistency in assessment, it also exposes gaps in digital literacy, infrastructure inequality, and doubts about the validity of evidence when clinical practice is hybrid or technology-mediated.
- Performance assessment instruments serve as tools that embody the trend toward direct, frequent, and specific evaluations of procedural performance. The evidence supports their usefulness but highlights challenges such as: the evaluator's reliability, peer/mentor

training, dedicated time, and high-quality formative feedback. Furthermore, the evaluation of competency-based training programs must consider not only student outcomes but also the fidelity of implementation, institutional readiness, and organizational outcomes, enabling continuous improvement processes (Hall et al., 2024).

On the other hand, higher education faces significant challenges that persist in the process of developing teaching competencies, specifically in the health sciences, such as:

- Validity and contextualization of assessment instruments to ensure reliable competency measurement, using scales designed for different contexts and culturally adapted. A Latin American validation agenda (construct validity, metric invariance, reliability) and reporting standards for instrument studies (COSMIN or others) are required.
- Although the supply of faculty training is growing, the teaching role remains strained by clinical workload, incentives focused on clinical productivity, and weak academic careers. Without institutional policies regarding course load, promotion criteria, recognition, and mentoring, CBME runs the risk of becoming merely formalistic (well-designed syllabi and matrices, but little practice in formative assessment and useful feedback).
- International frameworks call for the adoption of robust internal governance (education units, curriculum committees, assessment centers) and alignment with national agencies (e.g., CACES or equivalent bodies). Isolated curricular changes are not sustainable without improvement cycles, governance structures, and permanent institutional monitoring mechanisms (Karpinski et al., 2024).
- There appears to be a certain lack of integration of technologies with ethics and scientific evidence, with proposals emerging for the use of Artificial Intelligence (AI) in curriculum review and assessment support, enabling learning analytics, rapid feedback, and case banks. However, this requires taking on risks such as algorithmic opacity, bias, technological dependence, and the displacement of pedagogical judgment, as well as the lack of robust research on the actual impact on teacher and student learning, and the absence of guidelines for responsible use.
- Another important challenge is ensuring equity and sociocultural relevance. In this regard, Latin American studies emphasize the need for teacher competencies to include socio-humanistic dimensions (communication, interculturality, ethics, community health) and not be limited to technical skills. Urban-rural disparities and gaps in access to authentic clinical settings persist. Teacher education must incorporate local relevance and service-learning with communities.

- If we focus on the implications of this review for the development of teaching competencies in the health sciences, we can highlight the following:

- The need for a model of teaching competencies contextualized to the educational processes of Health Sciences degree programs and courses: adopting international frameworks, but adapted to the local reality (proficiency levels, observable evidence, rubrics with clear descriptors).

- The institutional framework must be strengthened to create or reinforce Health Education Units, with functions in training, curriculum design consulting, assessment, and educational research; there are already interesting examples in some countries.

- Organization of an assessment ecosystem: combine DOPS/mini-CEX/portfolios with learning analytics and inter-rater calibration mechanisms; prioritize high-quality feedback focused on clinical and epidemiological training.

- Faculty professional development, based on training pathways (basic–intermediate–advanced), mentoring, recognition, and incentives; include digital competence and responsible AI as domains.
- Need for a research agenda to validate instruments, conduct implementation trials (not just feasibility studies), and carry out impact studies on learning and clinical/organizational outcomes.
- Measuring equity and relevance: incorporate assessment of socio-humanistic competencies, community experiences, and social determinants of health; ensure access to real-world settings for faculty and student practice.

Although the reviewed evidence meets criteria for rigor, heterogeneity in study designs, modest sample sizes, and incomplete reporting of psychometric properties and implementation processes persist. Generalizations across countries should be made with caution due to differences in regulations and institutional capacity.

Conclusions

The reviewed evidence confirms that the development of teaching competencies in the health sciences is evolving from declarative curricular reforms toward institutional ecosystems capable of assessing actual performance, professionalizing faculty from an educational perspective, and leveraging emerging technologies with pedagogical approaches appropriate to the field of health sciences. The challenge is no longer to adopt a CBME model or something similar but rather to make these types of strategies work by maintaining valid and formative assessment, strengthening institutional management, recognizing the work of faculty, and closing gaps in digitization and sociocultural relevance. This represents a turning point that can lead from competence on paper to demonstrated and documented competence in sound teaching and clinical practice among the various health sciences professionals who serve as faculty in higher education.

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Assessment in the Preoperative Assessment Team (PAE) as a Critical Component of Clinical-Surgical Nursing Education

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Introduction

The primary purpose of this study was to examine, in a detailed and reflective manner, the actual status of the implementation of the assessment phase of the Nursing Care Process (NCP) by students completing their clinical-surgical rotation as part of the Rotating Internship program in the Nursing program at the Bolivarian University of Ecuador (UBE). Thus, the study aimed to determine the students' level of theoretical knowledge, attitudes, practical skills, and the various challenges they face during clinical practice when performing activities related to nursing assessment.

The assessment phase of the PAE is considered the foundation for developing individualized, safe, and effective care plans for patients; therefore, its proper execution is essential (Aguirre Raya, 2020) . By gathering information on the actual situation of nursing students, evidence was generated that made it possible to assess the scope of the problem, identify strengths, and understand the weaknesses that impact the delivery of quality care within the learning process all with the aim of training highly competitive and efficient professionals.

In this regard, the study provides relevant information that contributes to strengthening the teaching-learning process of the PAE by incorporating up-to-date pedagogical methodologies. It also highlights the role of nursing assessment as a strategic component for developing critical thinking and judgment in students, as well as for consolidating cognitive, technical, and attitudinal competencies.

Therefore, the presented research is a valuable resource that underpins the design of improvement actions and strategies to ensure practical training focused on patient safety and the quality of nursing care during the clinical and surgical rotations of the rotating nursing internship. This comprehensive preparation of students fosters the development of professionals who are critical thinkers, autonomous, competent, and committed to the quality and humanization of care.

Background and State of the Art

A fundamental characteristic of the nursing sciences is the application of humanized care that responds to patients' needs through tools such as the Nursing Care Process (NCP). This is a scientific method adapted to clinical practice, based on critical judgment that allows for the

selection and application of care in a logical, rational, and systematic manner, based on the patient's needs or responses (Tanzado et al., 2023) .

Various studies highlight that the PAE constitutes a scientific method adapted to healthcare practice through critical judgment, which allows for the establishment and application of nursing care in a logical, systematic, and rational manner, in accordance with the specific needs of each patient (Chamba et al., 2021; Tanzado et al., 2023). Over time, this process has established itself as an essential tool for ensuring humane, high-quality care. As such, it facilitates the organization, planning, and implementation of individualized, evidence-based care that incorporates a humanistic approach (Requelme et al., 2023) .

From a historical perspective, as part of the development of the nursing profession, the Nursing Care Plan (NCP) has evolved considerably. In 1955, Lydia Hall described nursing as a process aimed at defining the specific scope of action of this discipline, introducing concepts such as diagnosis and treatment and incorporating holistic and comprehensive care (González et al., 2023) .

Subsequently, theorists such as Johnson, Orlando, and Wiedenbach in 1959, 1961, and 1963, respectively as well as Virginia Henderson, Nancy Roper, and Dorothea Orem, helped consolidate nursing as a science oriented toward direct, ethical, and humanized patient care. Thus, it was proposed that nursing should involve an analytical and intentional process, based on the interaction between nurse and patient, promoting the application of critical and interpretive judgment that supports decision-making centered on the needs of each patient (Pineda and Salvatierra, 2024).

Methodologically, the Nursing Process (NP) began with three stages: assessment, planning, and implementation. In 1967, Yura and Walsh expanded these stages to four, and finally to five phases with the incorporation of the nursing diagnosis by Bloch, Roy, and Aspinall between 1974 and 1976 (Núñez et al., 2023) . Currently, the Nursing Care Process (NCP) is a key tool for ensuring the quality and continuity of nursing care, standardized through tools such as the NANDA, NIC, and NOC taxonomies, which enable the systematic documentation of diagnoses, interventions, and outcomes (Chamba et al., 2021; Alastre, 2024).

The integration of the PAE into academic nursing education strengthens students' skills in critical thinking, decision-making, care management, and leadership (Palencia, 2023) . These actions contribute to reducing adverse events and increasing patient satisfaction with the care and attention received (Requelme et al., 2023; Martínez, 2016).

However, various studies have identified barriers to the implementation of the PAE, especially in Latin American contexts, such as adverse working conditions, limited continuing education, care overload, high patient demand, institutional resistance to change, and various sociocultural factors in the environment (Gómez, 2021) . These limitations affect the quality of care and students' learning about the PAE, which in turn impacts their professional training and future performance in the healthcare field (Mai et al., 2022) .

In the clinical-surgical setting, it is essential to have adequate training and the development of competencies related to the PAE to ensure the safety and quality of care during preoperative, intraoperative, and postoperative processes; therefore, it is crucial to integrate theoretical, technical, ethical, and professional knowledge in these areas (Requelme et al., 2023) . The assessment phase allows for the identification of risk factors, individual needs, and potential

complications in the patient; therefore, it forms the basis for the nursing diagnosis and the planning of personalized care (Mai et al., 2022; Chamba et al., 2021).

To overcome these limitations encountered during professional nursing education regarding the teaching of the PAE, various authors propose strategies based on constructivist approaches and critical thinking. These strategies include conflict-based learning, clinical simulation, case studies, mentoring, and personalized guidance, with continuous feedback and coordination between educational institutions and hospitals (Mondragón and Sosa, 2020; Naranjo et al., 2018; Lofgren et al., 2023).

The implementation of these measures aims to ensure that students develop technical, cognitive, and humanistic competencies, while strengthening their autonomy, interdisciplinary work, and effective communication throughout their academic training (Jiménez et al., 2023) . In this context, the clinical rotation phase constitutes a key stage in students' professional training, during which the knowledge, attitudes, and skills essential for the practice of nursing are consolidated (Chamba et al., 2021; Martínez, 2016; Jiménez et al., 2023).

During the rotating nursing clinical rotation, the PAE becomes a fundamental tool for implementing care plans based on each patient's needs and available scientific evidence; furthermore, it allows students to apply critical judgment and ethical principles. Ongoing and effective supervision by clinical instructors is crucial for students to correctly apply the PAE and consolidate their competencies in clinical and surgical settings (Chamba-Tandazo et al., 2021) .

The effective implementation of the PAE in nursing education and practice enables students to provide effective, safe, and high-quality care to patients, grounded in scientific evidence, social responsibility, and critical thinking (Jabraeelzadeh et al., 2024) . Proper instruction and supervision during clinical rotations and academic nursing education constitute an essential pillar for the development of highly competent professionals committed to high-quality, humanistic, and patient-centered clinical practice (López et al., 2022; Mogollón and Quispe, 2020; Sánchez et al., 2019).

Nursing is a scientific and highly humanistic profession aimed at providing comprehensive and individualized care to people, their families, and their environment, in accordance with each individual's specific needs (Adamy et al., 2020) . The PAE is an essential tool for the planning, implementation, and evaluation of patient-centered care plans, in which the assessment phase is fundamental for identifying needs and guiding interventions based on the findings of this phase (Aguirre Raya, 2020; Correa et al., 2016).

Various studies conducted in different contexts have shown that nursing students in clinical rotations face difficulties in applying the assessment phase of the PAE due to knowledge gaps, problems mastering technical skills, and unmotivating learning strategies. This negatively impacts the safety, quality, and integrity of care, in addition to limiting the development of professional competencies for clinical practice (Requelme et al., 2023; Palencia, 2023; Pineda and Salvatierra, 2024).

In this context, the present study stands out for its originality and novelty by examining the implementation of the PAE assessment phase by nursing students in clinical-surgical rotations, using a combination of qualitative and quant y methods. This methodology allows for a contextualized assessment and evaluation of its effectiveness in real-world nursing practice settings, providing relevant information for the design of improvement initiatives focused on strengthening professional training in this field of healthcare.

The study contributes to the theoretical field by strengthening the understanding of the PAE as a highly relevant foundational tool for nursing. Furthermore, in the practical realm, it provides a research model that can be replicated in other contexts to promote the development of cognitive, technical, and attitudinal competencies among nursing students. Consequently, the presented research contributes to the scientific community by providing insights into the current reality of the nursing student body, which can be utilized for future research in response to the profession's contemporary demands.

Analysis of the data collected through the applied instruments allowed for the identification of strengths and limitations in the implementation of the PAE assessment phase by UBE nursing students in the clinical-surgical rotation. The main findings, based on the instruments used, are presented below:

The survey administered to 200 UBE nursing students in the rotating clinical internship program yielded relevant data regarding sociodemographic characteristics, theoretical knowledge, academic training, attitudes, and practical and communication skills, all of which play a role in the proper execution of the PAE assessment phase during the clinical-surgical rotation. To this end, a survey questionnaire was administered, and its results are described below:

The students were primarily between 22 and 25 years old, with the majority being female. In addition to the clinical-surgical rotation, 45% had already completed rotations in pediatrics, 25% in gynecology, and 30% in community health. Regarding specific training in the management of the PAE, a large percentage of students reported having received training in the past year, meaning they had a prior theoretical foundation. However, this training varies in scope and depth, with limited practical experience, which may influence their performance.

In terms of theoretical knowledge, 65% of students felt they had a clear understanding of the PAE and how to apply its stages, recognizing the importance of the assessment stage. However, only half correctly identified the elements that must be documented during the assessment, and just 45% reported knowing the validated scales and instruments for assessing risks such as falls, pressure ulcers, pain, or vital signs. There is a contrast between theoretical and practical knowledge, which could be a limitation for the early detection of patient problems and needs.

In terms of practical skills and procedures, 60% of students reported systematically collecting data during the assessment by conducting a medical history and physical examination. Meanwhile, 55% appropriately use validated scales when assessing their patients. Despite this, only half organize information adequately for subsequent nursing diagnosis, with 45% fully performing basic procedures during the assessment phase.

The findings in this dimension highlight the need to strengthen the integration of theoretical knowledge into clinical practice, due to a lack of information organization skills. These limitations can lead to errors in nursing diagnosis and the identification of specific needs, potentially affecting care planning. Regarding the attitudinal dimension, most students demonstrated high professional and ethical commitment when performing their care activities, treating patients well with respect, empathy, and preservation of their dignity. Furthermore, all students stated that they maintained the confidentiality of information at all times and responsibly carried out the assessment process. The results obtained reflect that, as part of their academic training, students have significantly strengthened their professional values and ethics, aligning well with the UBE student profile.

In the communication dimension, which assessed the interaction between the student, the team, and the patient, the results show that most students reported clearly communicating procedures and assessment findings to patients and their families, but only 65% verified that the information provided had been effectively understood. The same percentage interacts collaboratively with the work team.

Opportunities for improvement were identified regarding effective communication between students and family members, as well as the need to strengthen interaction with the multidisciplinary team. These findings could have a negative impact on coordination and interaction among healthcare staff and on patients' adherence to nursing care plans.

When analyzing the results related to the documentation of information in medical records, only 50% of students indicated that they maintain a complete and clear record of the assessment performed; meanwhile, 45% describe the clinical changes detected in patients and their communication and interaction with family members and the healthcare team. This information highlights the need to improve the documentation process as a priority intervention, given that incomplete documentation in medical records compromises patient safety and continuity of care. Regarding training, tutorials, and available resources, 70% of students perceive that the tutorials they receive during their internship rotation facilitate learning and strengthen their knowledge. Sixty-five percent believe that clinical simulations and practical activities conducted prior to the rotating internship helped improve their ability to properly assess patients.

In contrast, 40% of students indicated that the amount of tutoring time they receive during clinical-surgical rotations is insufficient, which limits opportunities to consolidate and strengthen practical skills for correctly applying the PAE, leading to feelings of insecurity when providing patient care.

In this regard, several strengths were identified among the students, primarily in the application of professional ethics, a willingness to engage in continuous learning, and the maintenance of positive attitudes. However, significant limitations were detected in the integration of theoretical knowledge into clinical practice and in the completion of comprehensive documentation of assessments in patient medical records. These limitations may compromise the quality of care and the continuity of health services, highlighting a problem that can be addressed through an intervention plan. Interviews were conducted with 10 clinical instructors from the Rotating Nursing Internship program, who are responsible for the clinical-surgical rotation. Semistructured questions were used to identify their perceptions regarding their students' application of the assessment phase of the PAE. To maintain the confidentiality of each interviewee, codes T1 through T10 were assigned. A summary of the responses collected is presented below:

Table 1. *Summary of Interview Results with Clinical Instructors*

Question	Response (summary)	Interpretation
1. How do you assess students' knowledge of the stages of the PAE and the importance of assessment?	T1–T8: They know the stages and understand the importance of assessment; they lack confidence in applying it in practice. T9 to T10: Acceptable knowledge, but they need to put more effort into applying it in practice.	Theoretical mastery; practical application varies depending on prior experience. Strengthen this area to improve practice

2. How effective are students at collecting and organizing information during the patient assessment?	T1 to T7: They conduct adequate history-taking and physical examinations, but have difficulty organizing data for documentation. T8 to T10: Records for nursing diagnosis are missing.	They gather information during the assessment but have limitations in organization and analysis; this affects the quality of the assessment
3. How would you describe students' ability to apply validated scales or instruments during the assessment?	T1 to T5: They apply some basic scales for risk assessment, though not always correctly. T6 to T10: Limited use of instruments and scales; more practice is needed.	There is knowledge of and partial application of scales/instruments for assessment. These skills need to be reinforced.
4. How do students demonstrate respect, ethics, and responsibility toward patients?	T1 to T10: They demonstrate empathy, respect, and responsibility at all times, while maintaining confidentiality.	Professional attitude and ethics are among the greatest strengths of nursing interns.
5. How do you perceive students' communication with patients, families, and the healthcare team during the assessment?	T1 to T7: They convey clear information but rarely verify that patients and family members understand it. T8 to T10: Communication with the healthcare team could be improved.	Communication with patients and family members is adequate; feedback needs improvement. Team interaction could be improved.
6. Do students correctly document findings in medical records, or are there areas for improvement?	T1 to T4: Acceptable records. T5 to T10: Incomplete or insufficiently detailed records, especially when describing clinical changes and patient and family education.	Weakness in the complete and detailed documentation of assessment results in medical records. This affects continuity of care.
7. Do you believe that tutorials and practical activities contribute to learning how to perform the PAE assessment?	T1 to T8: Tutorials and simulations are useful and reinforce clinical practice, but more time needs to be allocated. T9 to T10: Practical activities and simulations are helpful.	Tutorials and clinical simulations are highly valued, but they do not always occur with the necessary frequency or duration.
8. Do you believe that the time spent with students is sufficient to guide them in applying the PAE assessment?	T1 to T7: Time is limited for providing individualized feedback to each student. T8 to T10: More time needs to be allocated for supervision and tutoring.	Tutoring time is insufficient for close guidance and more feedback.
9. What strengths have you observed in students during the PAE assessment?	Q1–Q10: They demonstrate commitment, professional ethics, empathy, and responsibility. They maintain a willingness to learn.	Professional ethics and attitude are a key strength in the performance of nursing students.

10. What difficulties or areas for improvement do you identify in students regarding the implementation of the assessment phase of the PAE?	T1 to T10: Difficulties in organizing information, applying risk assessment scales, and fully documenting collected data and clinical changes in medical records.	Practical limitations affect the assessment, primarily including the application of scales and the documentation of findings in medical records.

Note: Results synthesized from interviews with clinical instructors.

An analysis of the responses provided by the tutors revealed a correlation with the results of the student survey. The tutors acknowledge that clinical rotation students possess a high level of theoretical knowledge about the PAE and the importance of correctly applying the assessment phase. However, they face difficulties in applying this knowledge in clinical practice, particularly in organizing the information collected during the assessment and in using risk assessment scales. Among the students' strongest attitudes are ethics, respect, empathy, and a commitment to learning; these constitute a key strength within their academic and professional training.

Regarding effective communication with patients, their families, and other members of the healthcare team, the preceptors indicated that there are weaknesses related to feedback processes and verifying understanding of information provided to patients and families, as well as limitations in interaction with the healthcare team. There is a recurring shortcoming in the completion of records regarding clinical changes, assessment findings, and communication with patients and family members in the medical record. Students do not always document information which could be essential for maintaining continuity and quality of care in a complete and detailed manner.

Regarding clinical supervision sessions, the interviewees agreed that the time allocated for these activities which involve feedback and individualized support is insufficient, despite their value in strengthening the learning process. The greatest strengths identified included the students' commitment to learning, ethics, respect, and confidentiality. Meanwhile, areas requiring improvement that were mentioned included the application of scales and assessment tools, the systematic organization and recording of information in the medical record, and the optimization of mentoring opportunities.

A total of 50 direct observations were conducted with students in the Rotating Nursing Internship program during their clinical-surgical rotation, using the previously designed Observation Guide. The results obtained demonstrated compliance with the dimensions defined in the Operationalization section regarding the implementation of the PAE assessment stage, as presented below.

Table 2. *Observation Results for Students*

Observed Item	Yes		No	
	N	%	N	%
1. Systematic collection of clinical data	30	60%	20	40%
2. Use of validated scales or instruments	25	50%	25	50%
3. Proper organization of collected information	24	48%	26	52%
4. Implementation of basic assessment procedures	28	56%	22	44
5. Treating patients with respect and empathy	48	96%	02	04%
6. Preservation of patient confidentiality and dignity	50	100%	00	00%
7. Responsibility and commitment during assessment	47	94%	03	06%
8. Communication of procedures and findings to the patient and family	35	70%	15	30%
9. Verifying the patient's understanding of the information	30	60%	20	40%
10. Collaboration with the healthcare team during the assessment	32	64%	18	36%
11. Complete and timely documentation in the medical record	25	50%	25	50%
12. Clarity and legibility of entries	27	54%	23	46%

Note: Results of student observations during clinical practice.

The observations showed that 60% of students systematically collected clinical data during the assessment, while 56% skillfully performed basic physical examination procedures and vital sign measurements. However, only 48% adequately organized the information they obtained, indicating a weakness in data organization and systematization necessary for an appropriate nursing diagnosis. Regarding the use of standardized risk assessment scales during the assessment, 50% applied them correctly, confirming the need to strengthen this aspect of clinical practice.

Another limitation that stood out was the documentation of information in the medical record, as half of the students recorded clear and complete data on clinical changes, relevant findings, and patient education as part of nursing care. In the attitudinal dimension, favorable results were found, as 96% of students demonstrated positive attitudes, treating their patients appropriately, respectfully, and empathetically, and 100% maintained the confidentiality of information and the dignity of patients. Additionally, 94% demonstrated a high level of responsibility and knowledge during the assessment process.

With regard to communication processes, 70% maintained appropriate relationships with patients and family members and clearly communicated findings and procedures. However, only 60% verified that the information provided was understood. Similarly, 64% maintained good communication with the healthcare team. These results reflect the need to strengthen feedback and interaction with patients and families, as well as relationships with the healthcare team.

The findings confirm that the students' strengths lie in upholding ethics and responsibility, while the identified weaknesses include organization, recording information in medical records, and the correct application of scales and assessment instruments. There is a need to reinforce clinical mentoring and implement practical training strategies in clinical and surgical areas.

For the document review, 50 medical records were considered, corresponding to patients cared for by students in the Rotating Nursing Internship program in clinical and/or surgical areas. A document review form was used to verify the quality and completeness of the records created during the PAE assessment phase. Upon organizing and synthesizing the results, the following findings were presented:

Table 3. *Results of the documentary review of medical records*

Item Observed	Yes		No	
	N	%	N	%
1. Complete identification data (name, age, sex, reason for admission)	45	90%	05	10%
2. Documented initial nursing assessment upon admission (medical history, background, and physical examination)	35	70%	15	30%
3. Identification of relevant biopsychosocial factors in the assessment	28	56%	22	44%
4. Recording of vital signs according to the specified frequency and relevant observations	38	76%	12	24%
5. Application of validated scales (pain scale, fall risk scale, pressure ulcer scale), with recording of assessment results	24	48%	26	52%
6. Organization of information obtained to facilitate the development of a nursing diagnosis	27	54%	23	46%
7. Individualized care plan documented based on the assessment	26	52%	24	48%
8. Recording of relevant clinical findings during assessment (changes in signs, symptoms, or clinical conditions)	30	60%	20	40%
9. Recording of communication and information provided to patients, family members, or the healthcare team that is relevant to the assessment	25	50%	25	50%
10. Clarity, legibility, and consistency in the medical record, chronology, and description of the patient's progress	32	64%	18	36%

Note: Results from a review of medical records.

The results show that most students properly record patient identification data and complete vital sign measurements, complying with the basic aspects of the PAE assessment. However, 48% of students demonstrated weaknesses related to the application of standardized scales and instruments for detecting risks such as falls and pressure ulcers, among others. Additionally, 54% had difficulties organizing the information collected to facilitate the nursing diagnosis, with evident gaps in the systematization of the assessment process.

Similarly, only 52% of the reviewed medical records included a documented and complete nursing care plan, with 50% containing records related to communication with patients, family members, and the healthcare team. These findings limit the application of the PAE, as well as the continuity and quality of care. Problems were also detected in the chronology and consistency of records in the medical records, as only 64% of the reviewed documents were legible and clear, which may compromise clinical traceability and the monitoring of patients' progress.

Upon conducting a general synthesis of the results, it was found that 36% of the reviewed medical records were of insufficient quality (<70%), 40% were classified as acceptable (70% to 85% quality), and 24% were of optimal quality (>85%). These results demonstrate the presence of strengths in students' basic technical skills and attitudes, but also reveal weaknesses in the management and documentation of information in medical records, the application of assessment scales and instruments, and the organization of information obtained during the PAE assessment.

As a methodological strategy to cross-check and validate the results obtained from applying the various data collection instruments, triangulation was performed on information that had been synthesized and organized by dimension. This procedure made it possible to identify strengths, key problems, and areas requiring improvement in order to ensure the proper implementation of the PAE assessment phase among nursing interns in the clinical-surgical rotation.

Nursing students in the clinical rotation have solid training and theoretical knowledge regarding the PAE and its stages, along with a high degree of professional, attitudinal, and ethical commitment, as well as empathy, responsibility, and respect toward patients. These aspects constitute the main strengths, as reflected in the four instruments used. Among the limitations are recurring problems in clinical practice, particularly the application of validated scales and instruments for risk assessment and detection, as well as the organization of collected information and its complete, clear, and timely documentation in the medical record.

The findings also revealed acceptable performance in the process of conveying information to patients and their families, but with shortcomings in verifying understanding of the information provided, as well as in interaction and communication with the healthcare team. These issues could affect the coordination and planning of care and the continuity of care provided by the multidisciplinary team.

Another relevant aspect is the value of clinical simulations and clinical mentoring, as highlighted by students and mentors, which significantly contributes to learning. However, there is a consensus that the time allocated is insufficient, which limits feedback, individualized support, and the consolidation of practical skills.

In summary, it is confirmed that students possess a solid theoretical foundation and positive professional attitudes, but there are critical areas that require improvement. Among these areas are the integration of theory into practice, the use of assessment tools and scales, the organization of information obtained during the assessment, and the quality of documentation in medical records.

Conclusions

The study allowed for an in-depth analysis of the application of the assessment phase of the PAE among nursing students in the clinical-surgical rotation of the UBE Rotating Internship Program, carried out during their clinical practice in the assigned clinical and/or surgical areas at various hospitals throughout the country. Through a comprehensive analysis of the instruments used to collect information, a broad and concrete picture was obtained of the level of performance achieved by nursing interns in this first stage of the PAE, which is fundamental to efficient, high-quality care.

The study confirmed the existence of a solid knowledge base and a well-developed attitudinal dimension regarding the application of professional ethics, respect, empathy, and

compassionate care toward patients and their families. The students maintain a willingness to learn, positive attitudes, and uphold the confidentiality and dignity of their patients. These findings highlight the high level of academic training in ethical and humanistic components, which constitutes their main strength and an indispensable foundation for professional practice.

In contrast, significant limitations were identified in the cognitive and procedural dimensions. Students exhibited recurring difficulties in the use and application of standardized scales and instruments for risk assessment and detection, the application of specific techniques, and the integration of theory into the clinical setting. These results highlight the need to strengthen teaching and learning processes aimed at fostering the development of critical analysis and the transfer of theoretical knowledge into practice.

Regarding communication between students and their patients, family members, and the healthcare team, the results showed that students are able to establish respectful contact and rapport with patients; however, the information provided is not always accurate, clear, or understandable. Furthermore, the educational and communication activities carried out by the students, as well as the reporting of updates or relevant findings to other members of the healthcare team, are not fully documented in the medical records. This is one of the main limitations identified in the study, which may negatively impact the quality and continuity of care.

The medical records reviewed revealed a significant problem related to the quality and completeness of the documentation of assessment results and findings during the implementation of the PAE. The documents reviewed did not meet the expected optimal standard of documentation quality, with omissions in the reporting of activities, clinical changes identified by nursing interns, and the education provided to patients and their families. This situation may compromise clinical traceability and the continuity of care.

Additionally, clinical mentoring and clinical simulation were identified as significant factors supporting the training processes of nursing students. Mentors provide guidance during the nursing students' clinical practice, but the time allocated for these activities is limited. This restricts individualized and ongoing support and hinders personalized feedback. There is a need to strengthen mentoring opportunities to enhance learning in the hospital setting.

The findings confirm that students in rotating clinical placements, during their clinical-surgical rotation, demonstrate an appropriate ethical and attitudinal disposition toward patient care and the application of the assessment phase of the Patient-Centered Care Model (PAE); however, they do not achieve comprehensive mastery of the communicational, procedural, cognitive, and documentation competencies required by a comprehensive, high-quality PAE.

Based on these results, it is concluded that tutors must implement innovative pedagogical and methodological strategies to enhance the integration of theoretical knowledge into clinical practice, including strengthening the use of standardized scales and instruments for the PAE assessment process, improving the quality of documentation in medical records, and allocating more time to mentoring and on-the-job support.

Finally, this research contributes relevant and useful evidence to the scientific community to drive improvements in academic and professional nursing education. It demonstrates that the application of the PAE requires not only scientific and technical knowledge but also a balance between critical thinking, practical skills, and effective communication competencies to ensure high-quality, efficient, and safe nursing care.

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Integrative community therapy among indigenous populations in Brazil

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Introduction

Indigenous peoples are recognized under United Nations General Assembly Resolution 49/214 of December 23, 1994, and the International Day of the World's Indigenous Peoples is observed on August 9, as designated by UNESCO, in support of the rights, cultures, and knowledge that are of vital human importance to those who defend cultural and biological diversity as world heritage, biosphere reserves, and global geoparks located throughout the world.

Globally, an estimated 476 million indigenous peoples live in 90 countries and account for 6.2% of the total population; and they speak 4,000 languages. It is a challenge for every national government to listen to, understand, and address the needs of these communities, focusing on safeguarding the integrity of nature, customs, and traditions through harmonious coexistence with the environment, the land, and family traditions as these communities serve as both internal and external stewards and managers. UNESCO (2024). The Global Action Plan for the International Decade of Indigenous Languages (2022–2032) aims to raise awareness within society of the interrelationships between language, culture, and identity, and to care for terrestrial and marine landscapes as ecosystems essential for human coexistence.

Furthermore, social determinants such as status, levels of recognition, and access to rights have historically remained unequal among indigenous peoples. This situation persisted even during the COVID-19 pandemic, which brought high mortality and case fatality rates amid a social crisis and widespread protests driven by urgent health needs. Athila, Adriana Romano. (2022). For this reason, indigenous movements have gained greater access to the media, building bridges to ensure their voices are heard through various activities and tourism, social, cultural, and environmental platforms within the framework of the United Nations Decade on Ecosystem Restoration. UNESCO (2021). In fact, areas occupied by indigenous peoples account for 35% of Latin America's forest area, with the vast majority located in Brazil, the Bolivarian Republic of Venezuela, Colombia, Mexico, Argentina, Peru, and the Plurinational State of Bolivia. Saatchi et al. (2020). However, there are enormous external threats to indigenous forests and habitats from mining, oil, agricultural, and forestry companies, as well as from ranchers, farmers, illicit groups, and land speculators, which have increased significantly. Walker et al. (2020). It is here that indigenous peoples are regarded as the caretakers and protectors of nature, which is the source of human life.

During the pandemic, governments limited their efforts to overseeing the health budget, thereby exponentially neglecting the vulnerability of the forests, water, and other natural resources in Indigenous territories. ECLAC (2020). Consequently, the plight of indigenous women is all the more evident in the face of socioeconomic discrimination and limited access to health services; furthermore, indigenous peoples' understanding of health and illness is shaped by spiritual, social, biological, and physical factors, and to address this, preventive measures and case isolation were implemented. IACHR (2020). Indigenous populations safeguard nature's treasures through their knowledge, ancestral practices, languages, and cultures. WHO (2021).

Regarding public health policies for Brazil's indigenous peoples, the state serves as the central link between society and the government; that is, it is responsible for designing and implementing strategic health initiatives that address the needs of the country's people. Latin American Center for Development Administration (CLAD), "State and Society in Latin America" (2023). It is also vital that public policies be developed from an intercultural health perspective, respecting different perceptions of health and illness and related practices. Aguilar-Peña, (2024).

Brazil's total population in 2024 reached 217.8 million people, of whom 1,693,535 are Indigenous people, equivalent to 0.83% of the country's population. During the pandemic, there were 45,000 confirmed cases and 620 deaths; men accounted for 61.5% of deaths, while women accounted for 38.5%. The age group with the highest mortality rate was 60 to 79 years old, with comorbidities such as diabetes mellitus (DM), hypertension (HTN), and obesity, with metabolic disorders being the common denominator among indigenous people. Roldan et al. (2023). On the other hand, the COVID-19 pandemic was exacerbated by the lifestyle, mythology, culture, diet, educational activities, and economic practices of indigenous populations, highlighting the risk of increased poverty and their reliance on natural remedies for healing. Garai (2023).

In Brazil, according to the National Policy on Health Care for Indigenous Peoples, progress has been evident in recent decades; the most notable achievement is the enshrinement of constitutional rights since 2010. Weiss (2023). Here, UNESCO has joined efforts to safeguard the cultural and linguistic diversity in Brazil of more than 25 indigenous peoples living near border regions. It is also recognized that the state urgently needs to create the conditions for indigenous populations to live without neglect or risk in the absence of social and cultural policies. Coímbra, et al. (2007). For this reason, from a demographic perspective, indigenous populations have been regarded as "microsocieties" since 1996. Azevedo (2006).

In the realm of public policy, the key issue is people's participation in health promotion. In this context, integrative community therapy serves as the key tool for addressing the various life situations in which individuals experience suffering, stress, addictions, loss, absence, vulnerability, trauma, anxiety, depression, loneliness, distress, intolerance, among other situations where a person is overwhelmed by a mental health problem that, if left untreated, becomes a biological or physical health problem, and so on. Science and technology have shown that the focus of human existence lies in knowing how to live in harmony with the universe; yet, the healthcare system has established a biomedical, biologically oriented, and drug-dependent model, even though the greatest challenge to achieving well-being and health lies in a holistic model that integrates the environment, values, and culture of societies. Camarotti et al. (2011). For this and many other reasons, "Integrative Community Therapy is a political action." Barreto (2023).

In this oasis of knowledge and social contexts, the family setting is highlighted as the center of life, viewed through a systemic lens, with all elements of its environment interrelated in a way that enables it to live and coexist. Furthermore, resilience is a highly complex term that encompasses the family's set of beliefs; it becomes a significant force that enables courage as a feeling to seek alternatives, solutions, and progress, linked to one's approach to life within the context of family, community, and social norms and rules. For this reason, the community applies resilience to understand and comprehend the various risks faced by individuals at both the individual and community levels, demonstrating that its abilities for collaboration and synergy enable people to overcome trauma and loss and promote healing and recovery from illness. Camarotti et al., (2011)

We must therefore address the richness of public policy within Brazil's healthcare system, known as Integrative Community Therapy (TCI), which began in a favela in Pirambù, Brazil, in 1987. It was created by Dr. Adalberto Barreto as a strategic health response to the enormous problem of unmet needs among individuals, families, and communities neglected by the healthcare system. From 1987 to 2024, Integrative Community Therapy (TIC) has mobilized resources and individual and collective skills within a welcoming space; and its political, theoretical, methodological, educational, and sociocultural significance has spread to more than 45 countries worldwide. It is delivered in two formats in-person and virtual in response to the demands of the SARS-CoV-2 pandemic, and the results have been remarkable in terms of mental health. It is free of charge and accessible to every person and community, significantly improving their quality of life. Silva et al. (2020). During the pandemic, indigenous populations also utilized Integrative Community Therapy (ICT); its methodology, as a treasure trove of mental health, enabled success in various indigenous communities, strengthened community bonds, and promoted holistic health through an intercultural approach.

Using the combination of search terms, a total of 160 scientific articles were identified. The PRISMA method was applied to filter and select articles through a two-stage screening process: first, an assessment of the content's relevance to the topic of interest; and second, an evaluation of full-text articles, methodological quality, and the depth of the data. Forty-five articles were excluded due to weak direct relevance, methodological limitations, and inconsistencies in data related to ICT among indigenous communities during the pandemic. Finally, 20 articles were included that allowed for qualitative and quantitative analysis and evaluation and met the inclusion criteria for the integrative review.

Of the 20 included articles, the year of publication was as follows: 2024 (15%, 3 articles), 2023 (25%, 5 articles), 2022 (5%, 1 article), 2021 accounted for 30% (6), and 2020 for 25% (5). Regarding the research topics, cross-sectional data on indigenous peoples during the pandemic predominated at 85% (15), while data on TCI in indigenous populations during the pandemic accounted for 15% (5) in Brazil. In other words, we have not identified any information covering all three categories of analysis in a single study. However, the analysis of TCI among indigenous populations during the pandemic focuses on examining the complexity represented by indigenous individuals, families, and communities within Brazil's social, political, economic, and cultural context on a global scale. Camarotti et al., (2011).

Indigenous peoples have weathered enormous changes and pressures of all kinds, and their living conditions are now more promising because their protection has gained visibility through international organizations such as the World Health Organization and the UN which reinforce and highlight their rights and responsibilities, amid diverse demographic characteristics, limited access to health services and mental health care, differences in languages of communication, and weak dialogue between government officials and key stakeholders. There is a wide range of reasons why they should be heard, attended to, cared for, protected, considered, and included throughout the state apparatus via public and health policies.

On the other hand, the included articles are mostly in Portuguese (45%, 9 articles), Spanish (40%, 8 articles), and English (15%, 3 articles). Information from Brazil predominates, as it is the chosen location for the study and analysis of this topic. Brazil maintains an interesting indigenous social pattern due to its public policies aimed at reducing gaps in health services, threats from climate change, and global pollution, among other issues. Indigenous peoples have consistently faced attacks and conflicts in their efforts to assert their rights throughout the colonial era and beyond. Haring et al., (2022).

Finally, the included articles contain extremely important information. With regard to integrative community therapy, it is evident that during the pandemic it was implemented virtually; its utility in settings involving indigenous populations is very positive because focuses on human adaptability and resilience. This demonstrates that there are no limitations to its implementation; that is, the support network provided by training centers and therapists ensures that the program is reliable and safe for both the individual and the community. However, further research on ICT among indigenous populations is needed, particularly with results that are widely disseminated and accessible.

Within the structure of indigenous populations, the issue of rights and duties within the state is deeply embedded, and the pandemic was a full-blown crisis for governments; for indigenous peoples, it was a crucial moment to analyze and demand greater attention and consideration both internally and externally as indigenous populations, to assess the outcomes of health care services as health policy, and to view TCI as a public policy in response to the mental health crisis.

At the level of international organizations, it is evident that the time has come for them to support indigenous populations in every respect; indeed, UNESCO has proclaimed the period from 2022 to 2032 the "International Decade of the World's Indigenous Languages," and the studies included in this research also emphasize the rights inherent to human beings within indigenous communities.

In light of the findings from the 20 scientific articles, we proceed to discuss them through analysis and descriptive synthesis based on the nature of each category in this study. First and foremost, Integrative Community Therapy is a complex methodological strategy of national and international significance due to its richness in providing mental health care at the community level and its contribution to minimizing and reducing indicators of violence, as well as psychosocial, biological, and emotional illnesses not only in urban and rural communities but also among indigenous populations and during the pandemic. This global health crisis led Brazil to establish new strategies for addressing mental health without barriers, borders, or limitations, with the aim of transforming lives and improving individual and collective quality of life. Silva (2020). Furthermore, TCI extends virtually through technology, coordinating the commitment of community therapists and various institutions via solidarity-based social media networks across Latin America as a sustainable practice in mental health. Colatusso et al. (2024). Secondly, indigenous peoples have diverse needs before, during, and after the pandemic: above all, openness and inclusion in health system programs and strategies within the framework of public health policy, as well as safeguarding the biopsychoemotional health of individuals. WHO (2024). In this context, sociopolitical movements have emerged that hinder equitable, accessible, and safe care for indigenous families. The UN has firmly addressed the issue of human rights in the 2030 Agenda. Weiss et al. (2023).

Thus, integrative community therapy is being implemented in the lives of Indigenous people during the pandemic a historic opportunity to transition from an in-person to a virtual methodology, with therapists from the communities themselves, who were trained and equipped to participate in active listening sessions and carry out all the steps of integrative community therapy as a mental health care strategy, achieving excellent results. Carneiro et al. (2020). Furthermore, ICT seeks to create intercultural connections, branches, and extensions so that no individual is left unheard, thereby enabling deep and systemic healing. Inti (2023).

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