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The journal publishes original research articles, review articles, academic essays and critical reviews, contributing to the advancement of scientific knowledge with both theoretical and applied relevance. It prioritizes work with methodological rigor, innovation and academic and societal impact.

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Tourism, innovation and territorial development: contemporary dynamics and sustainability challenges

Turismo, inovação e desenvolvimento territorial: dinâmicas contemporâneas e desafios da sustentabilidade

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ABSTRACT

This editorial marks a particularly significant milestone in the trajectory of **e³** – Journal of Economy, Business and Entrepreneurs in the CPLP, corresponding to the publication of the first regular issue following the journal's inclusion in the Scopus database. This achievement represents an important recognition of the journal's scientific quality, editorial rigor, and growing internationalization, while simultaneously reinforcing its commitment to the dissemination of knowledge relevant to both academic and professional communities. The articles included in this issue address current and multidisciplinary topics, reflecting some of the main challenges faced by institutions, students, and territories in a context of profound social, technological, and organizational transformation. Based on the contributions presented, three major thematic axes can be identified: institutional transformation, governance and innovation; students' experiences, competencies and development trajectories; and sustainability, innovation and territorial development. Taken together, the published works highlight the importance of scientific research in understanding contemporary processes of change and in supporting informed responses to future challenges.

Keywords: Scientific journals, Scopus, Higher education, Innovation, Sustainability, Territorial development.

RESUMO

O presente editorial assinala um momento particularmente relevante na trajetória da **e³** – Revista de Economia, Empresas e Empreendedores na CPLP, correspondendo à publicação do primeiro número regular após a integração da revista na base de dados ***Scopus***. Esta conquista representa um importante reconhecimento da qualidade científica, do rigor editorial e da crescente internacionalização da revista, reforçando simultaneamente o compromisso com a disseminação de conhecimento relevante para a comunidade académica e profissional. Os artigos que integram este número abordam temáticas atuais e multidisciplinares, refletindo alguns dos principais desafios enfrentados pelas instituições, pelos estudantes e pelos territórios num contexto de profunda transformação social, tecnológica e organizacional. A partir dos contributos apresentados, identificam-se três grandes eixos temáticos: a transformação, governação e inovação institucional; as experiências, competências e trajetórias de desenvolvimento dos estudantes; e a sustentabilidade, inovação e desenvolvimento territorial. Em conjunto, os trabalhos publicados evidenciam a importância da investigação científica na compreensão dos processos de mudança que caracterizam as sociedades contemporâneas e na construção de respostas informadas para os desafios do futuro.

Palavras-chave: Revistas científicas, Scopus, Ensino superior, Inovação, Sustentabilidade, Desenvolvimento territorial

INTRODUCTION

The publication of a new issue of a scientific journal always represents more than the mere gathering of articles. Each edition ultimately reflects the concerns, trends, and challenges that shape a particular moment in research and in society. This issue, however, carries a particularly special significance for **e³** – Journal of Economics, Business and Entrepreneurs in the CPLP.

After several years of editorial consolidation, strengthened scientific quality mechanisms, and increasing internationalisation, the journal has recently achieved one of the most significant milestones in its trajectory: its inclusion in the Scopus database. This achievement represents recognition of the work carried out by authors, reviewers, members of the scientific board, and the editorial team, but it also marks the beginning of a new stage. Being indexed in one of the leading international scientific databases increases the visibility of the research published, broadens its reach within the global academic community, and reinforces the responsibility to continue promoting high standards of rigour, transparency, and editorial quality.

The literature has shown that scientific indexing systems play a decisive role in the circulation of knowledge, in the internationalisation of journals, and in the construction of their academic reputation (Baas et al., 2020). It is a matter of creating the conditions for research produced in different contexts to participate actively in international scientific debates.

It is precisely within this context that the first regular issue of the journal following its inclusion in ***Scopus*** emerges. The contributions gathered here reflect some of the concerns currently affecting higher education, organisations, territories, and societies. Despite the thematic diversity that characterises the journal, it is possible to identify shared concerns. The transformation of institutions, the preparation of people for increasingly demanding contexts, technological innovation, sustainability, and the valorisation of territories appear as recurring themes throughout this edition.

We are living in a period marked by profound change. Higher education institutions face increasing demands for adaptation, internationalisation, and innovation. Digital transformation is reshaping organisational models previously regarded as stable. New skills are becoming essential for both students and professionals. At the same time, territories seek to assert their identity and competitiveness in an increasingly globalised world, where sustainability has ceased to be merely an environmental concern and has instead assumed a strategic and cross-cutting dimension (Lyulyov et al., 2024; Sporn & Godonoga, 2024).

The articles that make up this issue allow these transformations to be observed from different perspectives. Some focus on institutions and their processes of change. Others examine students, their expectations, skills, and challenges. Still others turn their attention to sustainability, innovation, and the ability of territories to position themselves within an increasingly competitive international context.

For reasons of analytical coherence, these contributions can be read through three main thematic axes. The first brings together studies dedicated to institutional transformation, governance, and innovation. The second focuses on students' experiences, skills, and developmental trajectories. The third addresses issues related to sustainability, innovation, and territorial development. Taken together, these three axes help us understand some of the most significant changes that characterise the present moment and that will continue to influence educational, organisational, and social processes in the years ahead.

INSTITUTIONAL TRANSFORMATION, GOVERNANCE AND INNOVATION

For a long time, discussions on education were strongly associated with the expansion of education systems. The challenge lay in building schools, increasing training provision, and ensuring access for an ever-growing number of students. In many countries, including Portugal, this expansion shaped several decades of educational policies. Today, these concerns remain, but they take on different contours. Institutions continue to grow and to seek ways of responding to new social needs, yet they simultaneously face demands related to quality, sustainability, digitalisation, accountability, and the capacity to adapt to contexts in constant transformation (Gabael et al., 2024; Sporn & Godonoga, 2024).

The studies gathered in this first axis reflect precisely this transformation. Although they focus on different realities, they all address issues related to how institutions organise themselves, make decisions, and seek to respond to increasingly complex challenges. More than discussing formal structures, they invite us to reflect on the governance models that underpin contemporary education systems.

The study dedicated to the evolution of the Educational Charter in Portugal offers a particularly interesting example of this shift in perspective. For many years, educational planning was strongly associated with the physical distribution of school facilities and the management of the educational network. The proposal for a third-generation Educational Charter, however, reveals a markedly different reality. The concepts of connectivity, territorial intelligence, data interoperability, and participation gain a relevance that could hardly have been anticipated just two decades ago. It is not merely a matter of incorporating technology. It is about recognising that educational decision-making processes increasingly depend on the ability to integrate information, anticipate needs, and coordinate different actors and scales of governance.

The studies devoted to Portuguese higher education also point to this growing institutional complexity. The analysis of the relationships between legal status, ownership, and institutional differentiation reminds us that institutions do not form a homogeneous group. Public debate often tends to reduce the system to the classic division between public and private. However, the reality is considerably more diverse. Governance models, control mechanisms, legal frameworks, and funding arrangements profoundly influence how each institution defines its strategies and exercises its autonomy. As recent literature has emphasised, understanding this diversity has become essential for interpreting the evolution of higher education systems and the challenges they face (Gabael et al., 2024; Sporn & Godonoga, 2024).

A similar reading can be applied to processes of merger, acquisition, and institutional restructuring. A few years ago, these phenomena were viewed primarily through the lens of corporate management. Today, they form part of the vocabulary of many higher education systems. In several European countries, institutions have adopted strategies of integration and reorganisation as a way of responding to declining student numbers, increasing competition, and the strengthening of evaluation and accreditation mechanisms (European University Association, 2019). The Portuguese case shows that these dynamics do not stem solely from financial constraints. They are also linked to the pursuit of greater organisational robustness and to the need to ensure conditions of sustainability in a particularly demanding context.

Technological innovation also runs through this set of reflections. The growing interest in the use of blockchain in auditing and quality assurance processes is only one manifestation of a broader transformation affecting organisations across different sectors. Digitalisation has

reshaped work processes, forms of communication, and mechanisms of supervision. In many cases, it has even changed the way institutions produce, store, and use information. Recent studies have shown that digital transformation is no longer viewed as a complementary process but has instead come to occupy a central place in organisational strategies and institutional governance models (Carmo et al., 2025). Similar dynamics can be observed in administrative and financial management processes. The integration of digital technologies into internal control systems has expanded the capacity of organizations to monitor operations, improve information quality, and support evidence-based decision-making. The growing use of integrated information systems, automation tools, and digital monitoring mechanisms illustrates how technological innovation is reshaping not only educational activities but also the organizational processes that sustain institutional performance and accountability. These transformations also raise broader questions regarding the relationship between education, digital skills, and organizational readiness for technological change. Recent debates on artificial intelligence adoption suggest that the capacity of organizations to integrate emerging technologies depends not only on internal resources and strategic choices but also on the educational systems responsible for developing future human capital. In this sense, digital education, AI literacy, and lifelong learning increasingly emerge as strategic dimensions of institutional transformation and innovation.

Interestingly, across the different studies, a question emerges that goes beyond the specific contexts analysed. How can institutions maintain the stability required to fulfil their mission without losing the capacity to transform themselves? The answer is unlikely to be found in a single reform, a single technology, or a single organisational model. The debate surrounding educational governance has shown precisely this. The quality of institutions depends on how effectively they can combine innovation with responsibility, autonomy with accountability, strategic vision with responsiveness to concrete problems. Unsurprisingly, recent reflections published in **e³** itself have emphasised the importance of transparency, governance quality, and the construction of organisations capable of responding to contemporary challenges without losing sight of the principles that justify their existence (Sardinha et al., 2025).

This may well be the central idea running through this first set of articles. Institutional transformation is neither an isolated episode nor a passing trend. It forms part of the everyday reality of educational organisations. Some changes are visible. Others occur more discreetly, within processes, relationships, and decision-making mechanisms. In all cases, they help explain why questions of governance, innovation, and institutional adaptation continue to occupy a central place in discussions about the future of education.

STUDENTS, SKILLS AND DEVELOPMENTAL TRAJECTORIES

While institutions occupy a central place within education systems, students remain their primary raison d'être. Understanding the student experience has become a more complex task than in the past. Academic trajectories are increasingly diverse. Social contexts change rapidly. Students' expectations do as well. Frequently, what determines academic success does not depend solely on the knowledge acquired in classrooms, but on a set of personal, social, and institutional factors that interact continuously.

The articles gathered in this second axis look precisely at this reality. Instead of focusing on structures or organisational models, they focus on people. On their expectations, their skills, the difficulties they face, and the opportunities they find throughout their academic path.

The study on preparation and perceived readiness in higher education reminds us that the transition to university continues to be one of the most demanding moments of academic

life. Entering higher education involves adapting to new learning methods, developing autonomy, and taking on responsibilities that often arise for the first time. Not all students experience this process in the same way. Previous experiences, the resources available, and the support received significantly influence how each student interprets and faces this stage.

The study dedicated to optimism in university students also draws attention to a dimension that is often less visible in the academic experience. The path in higher education is not built only through technical skills or disciplinary knowledge. Factors such as confidence, motivation, the ability to deal with adversity, and expectations regarding the future play a relevant role in how students face challenges and make use of opportunities. Recent studies have been reinforcing the importance of these psychological factors in shaping the intentions, choices, and behaviours of university students (Cardella et al., 2024).

The theme of entrepreneurship also appears with prominence in this set of studies. In recent decades, universities have been called upon to perform functions that go beyond the traditional mission of teaching and research. They are expected to contribute to innovation, to the creation of economic value, and to the development of entrepreneurial skills capable of responding to the demands of increasingly dynamic labour markets. The literature has shown that entrepreneurial intention results from a complex combination of individual, contextual, and institutional factors, in which self-efficacy occupies a central place (Gabael et al., 2024; Ismail et al., 2024).

The results presented in the study carried out with university students in Paraguay fit precisely within this line of research. The ability to identify opportunities, take calculated risks, and believe in one's own skills continues to prove decisive for the development of entrepreneurial intentions. At the same time, evidence is growing that entrepreneurial education and the support mechanisms provided by institutions can positively influence these dispositions, creating more favourable environments for the development of initiative and innovation (Fan et al., 2024; Song & Lu, 2024).

On the other hand, the challenges associated with student participation in digital contexts remain far from resolved. The study on absenteeism in virtual classes recalls a reality that has become particularly visible in recent years. Access to technology, socioeconomic conditions, family contexts, and levels of academic engagement continue to influence student participation in learning environments mediated by digital platforms. The expansion of online modalities has brought new opportunities, but it has also highlighted inequalities that were not always as visible in face-to-face models.

These issues find an echo in recent reflections on the challenges of sustainable higher education. Concern with the quality of education cannot be limited to academic results or institutional indicators. It also involves creating conditions that allow students to develop skills, build life projects, and participate fully in educational processes. In this sense, the sustainability of higher education is deeply linked to the ability of institutions to respond to the needs of their students and to follow the social transformations that shape the contemporary world (Manea et al., 2023).

Throughout this set of studies, a simple idea emerges. Students are not only recipients of educational policies nor merely users of education systems. They are active participants in the processes of learning, innovation, and social change. Understanding their experiences, expectations, and trajectories continues to be an essential condition for thinking about the present and the future of higher education.

Sustainability, innovation and territorial development

For a long time, the development of territories was analysed mainly through economic indicators. The growth of productive activity, the creation of employment, or the attraction of investment were the main elements used to assess their performance. Although they remain relevant, these indicators are no longer sufficient to understand contemporary reality. Territories compete for talent, for visitors, for companies, and for investment opportunities. They also compete for the ability to build a recognised and distinctive identity.

In this context, the way a territory presents itself to the outside has come to assume growing importance. The image of a country, a region, or a city is no longer only a consequence of its development. In many cases, it has become an integral part of the strategies used to promote it. The literature on "**country branding**" and "**place branding**" has shown precisely this evolution, highlighting how territorial reputation can contribute to the attraction of resources, to the valorisation of local assets, and to the strengthening of economic and social competitiveness (Aguilera-Cora et al., 2025; Tijani et al., 2024).

The relationship between sustainability and territorial development has been widely discussed in recent research. Contemporary approaches increasingly recognise that economic growth, environmental responsibility, social inclusion, and innovation should not be viewed as separate dimensions, but rather as interconnected elements of development strategies. Studies have shown that territories capable of integrating these dimensions tend to be better positioned to respond to demographic, technological, and environmental challenges while strengthening their long-term competitiveness (Lyulyov et al., 2024; Aguilera-Cora et al., 2025).

Innovation also emerges through the modernization of economic and administrative processes. The digitalization of business operations, including electronic invoicing systems and digital tax compliance mechanisms, has contributed to greater transparency, efficiency, and regulatory reliability. Beyond their operational benefits, these initiatives support more sustainable economic environments by strengthening institutional trust, improving governance practices, and facilitating interactions between organizations and public administrations.

The very notion of territorial development has been becoming more comprehensive. Issues related to quality of life, innovation, entrepreneurship, inclusion, and sustainability are today often analysed in an articulated way. This perspective is also present in reflections published in **e³**, which have highlighted the need to promote development models capable of generating economic value without losing sight of the social and environmental dimensions that sustain the progress of communities (e.g. Manea et al., 2023; D. Pereira et al., 2023; R. Pereira, 2021).

Perhaps for this reason, current debates on territorial development are increasingly less focused on the isolated promotion of resources or infrastructures and increasingly oriented towards the construction of ecosystems capable of combining innovation, sustainability, and identity. Territories are not only geographical spaces. They are spaces of relation, of memory, of knowledge, and of value creation. The way they can mobilise these elements will continue to influence their capacity for affirmation in a world marked by profound economic, social, and environmental transformations (El-Dabt et al., 2025).

Final Considerations

The articles gathered in this issue do not offer a single view of the challenges of the present. Nor would that be the role of scientific research. Their value lies precisely in the diversity of

perspectives, methodologies, and contexts analysed. Taken together, they remind us that the major transformations of our time do not occur in isolation. They cut across institutions, influence individual trajectories, and redefine the way territories build their future.

In a period in which the speed of change often seems to surpass our capacity for understanding, research continues to play an irreplaceable role. Not because it provides definitive answers, but because it helps to formulate better questions, to challenge established certainties, and to build knowledge capable of supporting more informed and responsible decisions.

It is with this commitment that **e³** begins this new stage of its editorial path. Inclusion in ***Scopus*** constitutes an important recognition of the work carried out over recent years, but it represents above all an increased responsibility towards authors, reviewers, readers, and institutions. Continuing to promote rigorous, relevant, and socially useful research remains the main challenge. It is also the best way to contribute to a scientific community that is more open, more critical, and better prepared to understand the complexity of the contemporary world.

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The publication of this issue holds particular significance as it represents the first regular issue released following the journal's inclusion in the ***Scopus*** database. This achievement reflects the collective work of all those who have contributed to the journal's development over the years and reinforces our commitment to fostering high-quality scientific research and knowledge dissemination within the international academic community.

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Da Territorialização à Smart Education: A Emergência da Carta Educativa de 3.ª Geração em Portugal

From territorialization to smart education: the emergence of the 3rd generation educational charter in Portugal

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Resumo

O artigo traça a evolução histórica do planeamento educativo em Portugal, desde a massificação da escolaridade pós 25 de Abril até à emergência da Carta Educativa de 3.ª geração, ancorada no paradigma da *Smart Education*. A revolução de 1974 democratizou o acesso à educação, sustentada por investimentos infraestruturais como o Plano dos Centenários (1941-1960), que construiu milhares de escolas, mas sob lógicas centralizadoras e uniformizadoras. A massificação intensificou desafios territoriais, despovoamento do interior, novas centralidades urbanas e exigência de qualidade, levando à criação da Carta Escolar (substituída pela Carta Educativa em 2003, Decreto-Lei n.º 7/2003). A 1.ª geração (2003) marcou uma viragem para a territorialização, articulando a rede escolar com o ordenamento municipal via Conselhos Municipais de Educação e revisões quinquenais. Contudo, manteve-se excessivamente focada na racionalização física e na infraestrutura, herdando a lógica edificatória do passado e com participação limitada. A 2.ª geração (2019, Decreto-Lei n.º 21/2019) ampliou o diagnóstico para variáveis socioeducativas, demográficas e de mobilidade, com instrumentos como o SACE e o Guião DGEstE/IGeFE (2021). Apesar dos avanços, não captura dinâmicas em tempo real (digitalização, migrações, conectividade, resiliência docente), nem promove governação colaborativa ou intermunicipal plena. A 3.ª geração, proposta como plataforma sistémica, digital e preditiva, transcende o físico e o municipal: integra ecossistemas de aprendizagem, dados interoperáveis, inteligência artificial e participação multinível. Alinha-se com agendas internacionais (Smart Education, Learning Cities, Education 5.0) e modelos como as ZEP (França), ZER (Espanha) e Neighbourhood Learning Centres (Canadá), que enfatizam equidade, redes colaborativas e integração comunitária. A metodologia combina análise normativa, revisão bibliográfica e estudo comparativo, sintetizada numa grelha analítica que destaca a transição: do infraestrutural ao estratégico, do tecnocrático ao colaborativo, do estático ao inteligente. A discussão sublinha a urgência de superar assimetrias, redundâncias e baixa participação, propondo uma governação baseada em evidência, plataformas digitais e monitorização contínua. A *Smart Education* é concebida como humanista, sustentável e centrada no valor público, com quatro pilares: inclusão territorial, sustentabilidade ambiental, digitalização inteligente e avaliação consequente. A Carta de 3.ª geração não é mera atualização, mas uma arquitetura de governação educativa que posiciona a escola como nó de inovação, coesão e desenvolvimento territorial, respondendo às transições digital, ecológica e demográfica com inteligência, equidade e participação.

Palavras-chave: Carta Educativa, Planeamento educativo, Smart Education, Territorialização

Abstract

The article traces the historical evolution of educational planning in Portugal, from post-April 25, 1974 massification of schooling to the emergence of the 3rd-generation Educational Charter, anchored in the Smart Education paradigm. The 1974 revolution democratized access to education, supported by infrastructural investments like the Centenaries Plan (1941–1960), which built thousands of schools under centralized, uniform logics. Massification intensified territorial challenges—interior depopulation, emerging urban centers, and quality demands leading to the creation of the School Map (replaced by the Educational Charter in 2003, Decree-Law No. 7/2003). The 1st generation (2003) marked a shift toward territorialization, linking the school network to municipal planning via Municipal Education Councils and five-year reviews. However, it remained overly focused on physical rationalization and infrastructure, inheriting past edificatory logic with limited participation. The 2nd generation (2019, Decree-Law No. 21/2019) expanded diagnostics to socio-educational, demographic, and mobility variables, supported by tools like SACE and the DGEstE/IGeFE Guide (2021). Despite progress, it fails to capture real-time dynamics (digitalization, migrations, connectivity, teacher resilience) or fully enable collaborative, inter-municipal governance. The 3rd generation, proposed as a systemic, digital, and predictive platform, transcends the physical and municipal: it integrates learning ecosystems, interoperable data, AI, and multi-level participation. It aligns with international agendas (Smart Education, Learning Cities, Education 5.0) and models like ZEP (France), ZER (Spain), and Neighbourhood Learning Centres (Canada), emphasizing equity, collaborative networks, and community integration. The methodology combines normative analysis, literature review, and comparative case studies, summarized in an analytical grid highlighting the transition: from infrastructural to strategic, technocratic to collaborative, static to intelligent. The discussion underscores the urgency of overcoming asymmetries, redundancies, and low participation, advocating evidence-based governance, digital platforms, and continuous monitoring. Smart Education is framed as humanistic, sustainable, and public-value-oriented, with four pillars: territorial inclusion, environmental sustainability, intelligent digitalization, and consequential evaluation. The 3rd-generation Charter is not a mere update but a governance architecture positioning the school as a node of innovation, cohesion, and territorial development, responding to digital, ecological, and demographic transitions with intelligence, equity, and participation.

Keywords: Educational Charter, Educational Planning, Smart Education, Territorialization

1. Introdução

Ao longo das últimas décadas, o sistema educativo português tem sido atravessado por um processo de transformação profunda, que alterou tanto a sua matriz organizativa como os próprios fundamentos da governação educativa. O momento fundacional de rutura situa-se, de forma inquestionável, na revolução de abril de 1974, que não apenas repôs as liberdades políticas e cívicas, mas também imprimiu ao campo da educação uma dimensão de cidadania e de democratização até então insuspeitada. A partir desse momento, o lema da "escola para todos" deixou de ser uma aspiração difusa e converteu-se num imperativo político e social, sustentado pela universalização progressiva da escolaridade obrigatória e pela abertura do sistema às diferentes camadas da população, independentemente da sua origem social ou localização geográfica (Teodoro, 2019).

Este processo de democratização do acesso não se fez de forma abrupta, mas resultou de um continuum histórico de expansão e de investimento em infraestruturas, já prenunciado no século XX com o "Plano dos Centenários", que previu a construção massificada e padronizada de escolas primárias em todo o território nacional, prevendo em simultâneo a possibilidade de projetos mais modernos, os especiais, de geografia pontual. Nesta linguagem entre o regionalizado e a abertura a alguma modernidade, ou seja, entre 1941 e 1960, foram edificadas mais de seis mil escolas e cerca de nove mil salas de aula, configurando a primeira grande etapa de universalização material das condições de escolarização em Portugal (Barreto, 1996; Nóvoa, 2005). Todavia, essa expansão massiva

obedeceu a lógicas centralizadoras e uniformizadoras, mais preocupadas com a disseminação de equipamentos, perpetuando uma visão administrativa e funcional da rede escolar refém da coeducação, e uma pedagogia ainda muito arreigada a cânones de recorte tradicionalista. Aliás, como refere Fabião (2014), idiossincrasia estranha aquela que, aparentemente pacífica, articulava uma normativa dogmática e ultrapassada de ensinar através de edifícios de desenho moderno e modernizadores do tecido urbano.

Recorde-se, no entanto, que a assinatura da Carta de Construções Escolares em Rabat em 1951, distinguiu o estatuto urbano da escola e, portanto, a sua relação com a habitação e a vida urbana, evidenciando a importância de integração da escola no planeamento urbano (Duarte, 2021).

Com a consolidação do regime democrático, a escolaridade obrigatória conheceu um alargamento progressivo, primeiro até ao 9.º ano e, posteriormente, até ao 12.º ano, o que intensificou a pressão sobre a rede escolar e evidenciou a necessidade de políticas públicas que fossem para além da mera construção de edifícios. A massificação trouxe consigo um conjunto de dilemas, mormente a desigual distribuição territorial da população, o fenómeno do despovoamento do interior, a emergência de novas centralidades urbanas e periurbanas e a crescente exigência de qualidade dos espaços educativos, em consonância com os paradigmas internacionais da "Educação para Todos" (UNESCO, 1990; UNESCO, 2000).

Foi neste quadro de profundas transformações demográficas, sociais e educativas que se afirmou a necessidade de dotar o país de instrumentos de planeamento mais sofisticados, capazes de articular as opções do ordenamento do território com as políticas educativas. A resposta política e legislativa a esta necessidade traduziu-se na substituição da Carta Escolar pela Carta Educativa, criada pelo Decreto-Lei n.º 7/2003, de 15 de janeiro. Este diploma veio regulamentar os Conselhos Municipais de Educação e determinou que cada município passasse a elaborar obrigatoriamente a sua própria Carta Educativa, sujeita a revisões de cinco em cinco anos, em articulação com o respetivo Plano Diretor Municipal (PDM). Este diploma representou uma verdadeira viragem para a territorialização das políticas públicas de educação, ao consagrar a escola como edifício-âncora do desenvolvimento local, articulando o diagnóstico demográfico, a análise das acessibilidades e a projeção das necessidades de oferta educativa com a estratégia municipal de ordenamento (Nápoles, 2011; Santos, Cordeiro & Alcoforado, 2016).

Paralelamente, também no plano internacional se afirmavam paradigmas que reforçavam a importância de territorializar a educação. Em França, as Zones d'Éducation Prioritaire (ZEP), criadas nos anos 1980, introduziram a lógica da intervenção diferenciada em função dos contextos territoriais (Rochex, 2011). Em Espanha, a experiência das Zonas de Educación Rural (ZER) revelou-se crucial para compreender a necessidade de associar o planeamento educativo à coesão territorial (Benito & González, 2014). Já no Canadá, o modelo das Community Schools e dos Neighbourhood Learning Centres antecipou uma visão integrada de serviços educativos, sociais e culturais, assumindo a escola como epicentro do desenvolvimento comunitário (Fullan, 2010). Estes exemplos reforçam a pertinência da Carta Educativa portuguesa como instrumento inovador, ainda que tributário de uma trajetória histórica marcada pela tensão entre centralização e descentralização, entre uniformidade e diferenciação, entre o universalismo da escola pública e a especificidade dos territórios. Nesta linha, a literatura recente reforça a necessidade de políticas educativas place-based com governação multinível e avaliação consequente, aproximando o planeamento educativo dos referenciais internacionais de cidades inteligentes e de aprendizagem ao longo da vida (OECD, 2024; UNESCO Institute for Lifelong Learning, 2017).

Deste modo, a introdução das Cartas Educativas deve ser compreendida como culminar de um processo histórico de metamorfose do sistema educativo português, que, partindo da democratização pós-25 de Abril e da massificação do ensino básico, encontrou no planeamento territorial uma resposta necessária às novas exigências da sociedade contemporânea. As Cartas Educativas emergem, assim, como dispositivos de racionalidade técnico-jurídica e de coprodução entre Estado e municípios, permitindo não apenas a adequação da rede escolar à procura efetiva, mas também a construção de um modelo de escola mais próximo das comunidades, mais atento às singularidades demográficas e territoriais e mais sintonizado com as agendas internacionais de equidade, coesão e desenvolvimento sustentável.

Apesar da sua importância, a experiência das Cartas Educativas de 1.ª geração evidenciou limitações significativas, decorrentes do seu ponto de vista quase exclusivo no ordenamento físico da rede e na racionalização das infraestruturas escolares. Esta orientação, que herdava ainda a lógica centralizadora do Plano dos Centenários e dos Planos Especiais, revelou-se insuficiente para responder à complexidade crescente dos territórios educativos, marcada pela diversificação social, pela mobilidade das populações, pelas assimetrias regionais persistentes e pela exigência de articular a escola com novas ofertas educativas e formativas, numa perspetiva de coerência territorial e de promoção da equidade. Como assinalam Santos, Cordeiro e Alcoforado (2016), a evolução da rede não poderia continuar a assentar apenas em critérios de dimensão ou de localização dos edifícios, exigindo-se uma visão mais ampla e estrategicamente sustentada no conhecimento das dinâmicas demográficas, económicas e culturais de cada território. Também Fetéira (2013), na sua análise ao Plano dos Centenários, demonstra como a prioridade atribuída à dimensão construtiva, apesar de fundamental para a democratização da escolarização, acabou por reduzir a leitura da escola à sua materialidade, relegando para segundo plano a compreensão do papel da escola como espaço de coesão social e desenvolvimento comunitário.

Foi precisamente para superar estas limitações que o legislador aprovou o Decreto-Lei n.º 21/2019, de 30 de janeiro, instituindo as Cartas Educativas de 2.ª geração. Estas passaram a ser concebidas como instrumentos de planeamento territorial e estratégico, assentes em diagnósticos socioeducativos mais abrangentes, que integram não apenas a distribuição espacial da rede escolar, mas também dados sobre fluxos populacionais, dinâmicas de mobilidade, taxas de natalidade e evolução da procura educativa. O novo quadro normativo foi acompanhado de instrumentos metodológicos específicos, como o Sistema de Avaliação das Cartas Educativas (SACE) e o Guião para a Elaboração das Cartas Educativas, elaborado pela DGEstE e IGeFE (2021), que permitiram uniformizar procedimentos e reforçar a transparência e comparabilidade dos documentos produzidos (Estanqueiro & Tenedório, 2015).

Adicionalmente, a literatura destaca que a 2.ª geração das Cartas Educativas respondeu à necessidade de aprofundar a articulação entre a educação, o ordenamento do território e o desenvolvimento local. Como defende Cordeiro (2013), o planeamento educativo não poderia permanecer "um exercício técnico de redistribuição de escolas", mas deveria assumir-se como um processo estratégico, participativo e intersectorial, capaz de alinhar a rede escolar com os projetos de regeneração urbana, as políticas de coesão territorial e os desafios da educação inclusiva. Esta perspetiva é corroborada pela investigação de Nápoles (2022), que realça a importância da Carta Educativa como instrumento dinâmico e adaptativo, preparado para incorporar indicadores sociais, económicos e culturais, numa lógica de escola enquanto território de aprendizagem e não apenas como edifício físico.

Nas práticas de planeamento mais recentes, torna-se evidente que a 2.ª geração das Cartas Educativas, tal como enquadrada pelo Decreto-Lei n.º 21/2019, de 30 de janeiro, estabilizou procedimentos de diagnóstico e ordenamento, mas não captura plenamente a natureza dinâmica dos territórios educativos num contexto de transição demográfica, digital e socioeconómica acelerada, que convoca novas métricas de equidade e de bem-estar, a articulação com fluxos migratórios, a intermodalidade na mobilidade escolar e a integração de dados em tempo quase real. O próprio diploma de 2019 define a Carta como reflexo municipal do ordenamento nacional e intermunicipal, com parâmetros técnicos rígidos de rede, adequação de oferta e racionalização de recursos, útil para uma fotografia estruturante mas limitada para uma governação antecipatória e adaptativa (DL 21/2019). A instrumentação subsequente, o já referido Guião de 2021 e o SACE, reforça a comparabilidade e a transparência do processo, mas permanece focada em ciclos de revisão e em matrizes de evidência que não integram, de forma sistemática, indicadores de transformação digital (uso pedagógico de tecnologia, competências digitais, dados de conectividade), de resiliência socioeducativa (respostas a faltas de docentes, absentismo, percursos alternativos) ou de transições demográficas complexas (decréscimo de natalidade combinado com aumento de alunos estrangeiros em certos concelhos), dimensões hoje críticas para a decisão (IGeFE, 2021; DL 21/2019). A evidência estatística e noticiosa recente reforça essa pressão de mudança, nomeadamente a natalidade que voltou a cair em 2024, com cerca de 84 650 nascimentos, enquanto o sistema enfrenta variações territoriais na procura, e tensões de colocação de docentes com impacto direto na efetividade da oferta, fatores que uma Carta de 2.ª geração não foi desenhada para monitorizar e antecipar com granularidade (RTP/Lusa; Expresso). Ao mesmo tempo, a experiência municipal acumulada (v. g., as revisões e diagnósticos mais recentes de Cartas Educativas de Lisboa, Óbidos, Seia, Leiria, Oleiros, entre outras) mostra um esforço meritório de leitura socioeducativa e de alinhamento com estratégias locais, mas evidencia também a necessidade de incorporar painéis de dados vivos sobre mobilidade, procura formativa e serviços educativos complementares, para além do edifício e da sala de aula, bem como de associar o planeamento escolar a políticas urbanas de proximidade e a redes de serviços partilhados (Cartas Educativas municipais, 2023-2025). Acresce que a transformação digital pós-pandemia, materializada em programas nacionais como a Escola Digital e em agendas europeias e nacionais para a transição digital, alterou estruturalmente as condições de acesso, os ambientes de aprendizagem e os requisitos de conectividade, exigindo que o planeamento da rede escolar integre dispositivos, competências e infraestruturas digitais como variáveis críticas do direito à educação, e não apenas como medidas paralelas de modernização (PATD/RCM 30/2020; DGE/Digital Education Action Plan). Em convergência, a agenda internacional tem vindo a reclamar um "novo contrato social para a educação", orientado para sistemas capazes de aprender com dados, de promover bem-estar, sustentabilidade e agência dos estudantes, e de se reorganizarem por ecossistemas de aprendizagem distribuída — uma orientação que reforça a pertinência de uma Carta Educativa de 3.ª geração, de base preditiva, interoperável e participada (UNESCO, 2021; OECD, Learning Compass 2030).

2. Nota Metodológica

Para sustentar a análise comparativa entre as três gerações de cartas educativas em Portugal e os modelos internacionais de planeamento educativo, foi seguida uma abordagem metodológica qualitativa, de base documental e interpretativa, respaldada em três eixos complementares: (i) análise normativa e legislativa, (ii) revisão crítica da literatura científica e técnica, e (iii) estudo comparativo de experiências internacionais previamente selecionadas.

No primeiro eixo, procedeu-se à análise dos principais diplomas legais que enquadram a evolução das cartas educativas, nomeadamente o Decreto-Lei n.º 7/2003, de 15 de janeiro, e o Decreto-Lei n.º 21/2019, de 30 de janeiro, bem como dos instrumentos metodológicos associados, como o Guião para a Elaboração das Cartas Educativas (DGEstE & IGeFE, 2021) e a plataforma digital denominada "Sistema de Avaliação das Cartas Educativas" (SACE). Esta análise permitiu identificar os pressupostos normativos, os parâmetros técnicos e as orientações estratégicas que moldaram cada geração de carta educativa.

No segundo eixo, a revisão sistemática da literatura incluiu artigos científicos indexados em bases como Scopus e Web of Science, nomeadamente os trabalhos de García-Tudela et al. (2021), Mandinach & Schildkamp (2021) e Ansell & Gash (2008), localizados através de pesquisa estruturada por palavras-chave como "smart education", "territorial planning" e "educational governance". Foram selecionados pela sua relevância teórica e empírica para a análise das transformações contemporâneas no planeamento educativo. Todavia, toda a revisão documental permitiu cotejar os contributos teóricos e empíricos que sustentam a evolução conceptual das cartas educativas, bem como identificar os desafios emergentes associados à transição digital, à equidade territorial e à sustentabilidade.

Por fim, no terceiro eixo, foi combinada uma análise comparativa de casos internacionais de boas práticas, nomeadamente as Zones d'Éducation Prioritaire (França), as Zonas de Educación Rural (Espanha) e os Neighbourhood Learning Centres (Canadá), selecionados com base na sua relevância para a territorialização da educação e na disponibilidade de documentação acessível. Esta análise foi orientada por critérios de funcionalidade territorial, integração intersectorial e inovação pedagógica, permitindo estabelecer paralelismos e contrastes com o modelo português.

Para clarificar o percurso analítico selecionado, apresenta-se uma grelha analítica que sintetiza as principais dimensões de evolução entre as três gerações de cartas educativas em Portugal (as duas já operadas e a terceira, como proposta), articulando-as com referências internacionais relevantes. Resultado da triangulação metodológica entre a leitura normativa, a revisão de literatura e o estudo comparado de casos internacionais, é possível visualizar a transição de um modelo centrado na racionalização física da rede escolar para um paradigma territorialmente inteligente, orientado por dados, participação e sustentabilidade (Tabela 1).

Tabela 1 – *Principais dimensões de evolução entre as três gerações de cartas educativas em Portugal*

Dimensão	1.ª Geração	2.ª Geração	3.ª Geração / Modelos Internacionais
Foco principal	Infraestrutural e edificatório – requalificação do parque escolar	Diagnóstico socioeducativo	Planeamento estratégico, digital e inteligente
Escala territorial	Municipal	Municipal com articulação intermunicipal	Intermunicipal e multinível (governação colaborativa)
Instrumento legal	DL n.º 7/2003 + plataforma CE + Guião (ME, 2000)	DL n.º 21/2019 + SACE + Guião (DGEstE & IGeFE, 2021)	Plataformas digitais, dados em tempo real, interoperabilidade (Mandinach & Schildkamp, 2021)
Participação	Limitada, tecnocrática	Moderada, com envolvimento municipal	Colaborativa, com momentos de decisão partilhada (Ansell & Gash, 2008)
Integração digital	Ausente	Parcial e não sistemática	Central, com indicadores de maturidade digital e conectividade (UNESCO, 2021; European Commission, 2020)

Alinhamento internacional	Fraco (Educação para Todos)	Parcial (aprendizagem ao longo da vida)	Forte (Smart Education, Learning Cities, Education 5.0)

3. A Carta Educativa de 1.ª e de 2.ª Geração

A institucionalização da carta educativa, pelo decreto-lei n.º 7/2003, de 15 de janeiro, marcou uma inflexão substantiva no modo como o estado e os municípios passaram a coproduzir o ordenamento da rede escolar, deslocando o eixo do mero inventário edificatório para um instrumento jurídico-técnico de diagnóstico, prospetivo e de decisão com base territorial, ao determinar a obrigatoriedade da sua elaboração em todo o território nacional, bem como a sua revisão quinquenal em articulação com os planos diretores municipais.

O legislador inscreveu no centro da governação educativa uma gramática *place-based*, ancorada em leituras demográficas, padrões de mobilidade e acessibilidades, e em critérios de adequação da oferta à procura efetiva. Mais do que um simples mapeamento de escolas, a carta educativa de 2003 instituiu uma matriz de racionalidade pública que condiciona localização, dimensão e composição da rede, convocando os conselhos municipais de educação para uma governança multinível e dialogante.

No plano funcional, a 1.ª geração de Cartas Educativas desenvolveu-se num contexto em que se entrecruzavam dois vetores estruturantes, a consolidação da massificação do acesso e a modernização do parque escolar. O primeiro radicava na herança da expansão da rede iniciada com o Plano dos Centenários, posteriormente consolidada no período democrático através de outros planos e programas, traduzindo-se na universalização progressiva da escolaridade obrigatória e na pressão crescente sobre infraestruturas envelhecidas.

A literatura reconhece, todavia, o carácter ambivalente desta primeira geração da carta educativa, por um lado foi assumida como "instrumento legitimador do reordenamento prospetivo" das redes municipais, viabilizando o ganho de escala no 1.º ciclo, a redução de dispersões e a transição para tipologias mais funcionais, por outro, herdou uma matriz excessivamente infraestrutural, uma centralização procedimental e uma integração ainda frágil de dimensões socioeducativas e participativas. Este balanço, amplamente registado na investigação, evidencia o salto qualitativo introduzido em 2003, mas também os limites de um desenho demasiado centrado no edifício e insuficientemente atento às dinâmicas sociais, culturais e económicas que a escola encarna no território.

Para compreender a espessura histórica desta ambivalência, é útil regressar à genealogia longa do planeamento escolar enquanto política pública, onde o plano dos centenários funciona como arquétipo de universalização material e, simultaneamente, como matriz de tipificação e uniformização. como demonstra Féteira (2013), o programa de 1941-1956 não se limitou à arquitetura dos edifícios, antes explicitou "as relações da mesma com o âmbito político dos objetivos do estado novo para a educação", do desenho regionalizado de 1935 à construção efetiva em série, suportada por cadernos de encargos e contratos-tipo. esta "arquitetura de regime", tipificada por regiões e escalas de sala, tornava exequível a massificação e a cobertura territorial, mas cristalizava também uma lógica edificatória como solução-padrão para problemas plurais.

A filiação técnico-formal dessa época é visível na tipificação minuciosa: plantas de uma, duas, três e quatro salas, com configurações de gémeas ou simples (Nápoles, 2014); variantes para um ou dois sexos; alçados e soluções de fenestração marcadas por regionalização material e cromática, e uma preocupação funcional com alinhamentos que facilitavam acrescentos posteriores sem quebrar a continuidade volumétrica. A documentação reproduzida

comprova a estandardização como condição de possibilidade da expansão e ao mesmo tempo sedimentou uma leitura da escola como objeto primordialmente construtivo, leitura que ressoará, décadas depois, na tendência infraestrutural dominante nas primeiras cartas educativas.

O segundo momento, o da democratização da rede escolar, encontrou expressão no Programa de Modernização do Parque Escolar do Ensino Secundário, lançado em 2007 e cuja governação foi confiada à empresa pública "Parque Escolar, E.P.E.", criada especificamente para assegurar, através de maior flexibilidade administrativa e autonomia financeira, uma requalificação em larga escala que a administração educativa tradicional dificilmente conseguiria concretizar nos prazos e com a magnitude pretendida.

A opção pelo recurso a uma empresa pública permitiu ganhos significativos na qualidade arquitetónica, funcional e ambiental dos edifícios escolares, promovendo soluções inovadoras de abertura à comunidade e integração urbana, contudo, desde cedo se tornaram visíveis críticas relevantes (Peniche Bertão & Alves, 2020; Rodrigues, 2022). Desde a sua génese, o programa de modernização trouxe consigo a sombra da controvérsia, não apenas pelo vulto financeiro que assumiu, mas sobretudo pela fragilidade da sua sustentabilidade, ancorada em mecanismos de endividamento que projetavam para o futuro encargos pesados sobre o erário público (Tribunal de Contas, 2012). As leituras críticas que se lhe seguiram confirmaram essa perceção, revelando falhas na execução contratual, fragilidades nos mecanismos de supervisão e gestão da despesa, e, acima de tudo, uma concentração desmedida de recursos no ensino secundário, deixando em latência o ensino básico, precisamente o nível onde as carências estruturais reclamavam uma resposta mais urgente e equitativa (Rodrigues, 2022; Alves, 2011).

O entrelaçar destes fatores acabou por revelar uma tensão estrutural em que a escola se anunciava como símbolo de pós-modernidade, tecnologicamente aparelhada e arquitetonicamente requalificada, enquanto se sedimentava, no espaço público e académico, a perceção de um programa financeiramente gravoso, de sustentabilidade incerta e incapaz de responder, com equidade, às carências latentes nos diferentes patamares da escolaridade obrigatória.

Esta ambivalência, visível no modo como o programa de modernização escolar conjugava ganhos evidentes de qualidade arquitetónica com críticas severas sobre os seus custos e abrangência (Peniche Bertão & Alves, 2020), projetou-se inevitavelmente na própria conceção e aplicação das cartas educativas de 1.ª geração. Estas, concebidas no início dos anos 2000 como instrumentos jurídico-técnicos de planeamento (Costa & Sebastião, s.d.), acabaram por ser fortemente condicionadas pela dimensão infraestrutural da política educativa, perpetuando, ainda que sob novas formas, a lógica edificatória herdada do Plano dos Centenários.

Em muitos municípios, a elaboração da carta educativa concentrou-se sobretudo na racionalização da rede física, privilegiando critérios de dimensão, ocupação e eficiência construtiva, em detrimento da leitura mais complexa das dinâmicas sociais e culturais que configuram os territórios educativos. A escola foi entendida sobretudo como unidade física a encerrar, concentrar ou reconfigurar, relegando para segundo plano a sua condição de espaço de coesão comunitária, de identidade territorial e de dinamização do desenvolvimento local. Esta perspetiva, como assinala Cordeiro (2013), reduziu a carta educativa a um exercício técnico de redistribuição de equipamentos, incapaz de captar a pluralidade de funções que a escola desempenha no território.

Acresce que a 1.ª geração da carta educativa deixou transparecer fragilidades estruturais no domínio participativo, na medida em que os Conselhos Municipais de Educação, concebidos normativamente como instâncias de coprodução e deliberação plural, se converteram, na prática, em espaços frequentemente submetidos a lógicas centralizadas e tecnocráticas. Tal circunstância esvaziou a densidade democrática da participação e reduziu a voz das comunidades educativas, transformando o planeamento num exercício percecionado como imposição administrativa, mais fiel à racionalidade economicista da contenção de custos do que a uma estratégia genuína de promoção da equidade territorial. Esta prevalência da dimensão infraestrutural, em articulação com a centralização procedimental e a escassa densidade participativa, explica a razão pela qual a carta educativa de 1.ª geração foi incapaz de antecipar fenómenos emergentes, como a diversificação da procura educativa, a crescente mobilidade das populações ou o impacto das migrações na recomposição da rede escolar (Rochette Cordeiro et al., 2017; Costa & Sebastião, s.d.). A carta educativa respondeu à exigência de reorganização física, mas não à metamorfose sociológica e demográfica do território, permanecendo, por isso, um instrumento de planeamento mais voltado para o passado do que para o futuro (Arcanjo Martins, 2017; IGeFE, 2021).

A consciência destas limitações, reiterada em sucessivos relatórios técnicos, diagnósticos municipais e estudos académicos, acabou por evidenciar a necessidade de uma revisão profunda do modelo. O predomínio da racionalidade infraestrutural, a centralização procedimental e a ausência de métricas que captassem as dinâmicas socioeducativas em transformação expuseram a Carta Educativa de 1.ª geração a um risco de obsolescência precoce, numa altura em que o sistema educativo se confrontava com desafios inéditos, desde a quebra demográfica à crescente diversidade cultural. Foi neste quadro que o legislador procurou responder, aprovando o Decreto-Lei n.º 21/2019, de 30 de janeiro, que redefiniu finalidades, parâmetros técnicos e procedimentos de elaboração das cartas educativas, inaugurando, assim, a sua 2.ª geração. Com esta alteração normativa, o planeamento deixou de estar centrado exclusivamente na rede física de escolas e passou a incorporar diagnósticos mais abrangentes, apoiados em dados socioeducativos, projeções demográficas e análises de mobilidade, numa tentativa de alinhar o ordenamento da rede escolar com os imperativos de equidade territorial, coesão social e sustentabilidade.

4. A EMERGÊNCIA DA 3.ª GERAÇÃO

A emergência da 3.ª geração da Carta Educativa traduz um reposicionamento profundo deste instrumento de planeamento, que deixa de ser meramente cartográfico e normativo para se transformar numa plataforma sistémica, digital e intermunicipal, coerente com os paradigmas da *Smart Education* e da governação colaborativa (Rothes & Castro, 2014). A escola deixa, assim, de ser entendida apenas como um ponto estático no mapa para assumir-se como nó estratégico de cuidado, inovação e presença comunitária, numa lógica que reconhece a educação como ecossistema territorial vivo e inteligente. Tal mudança decorre, em grande medida, da própria descentralização educativa, que pressupõe corresponsabilidade entre os diferentes níveis de governo e os atores locais, convocando a construção de arenas de decisão partilhada e orientada ao consenso, tal como a literatura da governação colaborativa sugere (Ansell & Gash, 2008). Nesta perspetiva, a carta educativa de 3.ª geração deve operacionalizar uma *Smart Education* humanista e centrada no valor público, integrando tecnologia, participação e sustentabilidade como eixos estruturantes (Open Praxis, 2023; Smart Cities, 2023).

Assim, a transição da territorialização para a *Smart Education* concretiza-se através de três movimentos estruturantes: em primeiro lugar, do físico ao sistémico, na medida em que a

rede escolar passa a ser encarada como ecossistema inteligente e inclusivo, integrando escolas, centros de recursos, plataformas digitais e espaços comunitários. Em segundo lugar, do municipal ao intermunicipal, dado que o planeamento deve ultrapassar fronteiras administrativas, promovendo redes colaborativas de municípios e entidades educativas, em consonância com o disposto no Decreto-Lei n.º 21/2019, que reconhece a carta educativa como reflexo do processo de ordenamento também a nível supramunicipal. Finalmente, do técnico ao estratégico, pois a carta educativa da 3.ª geração não se limita a diagnosticar necessidades, mas afirma-se como documento orientador de políticas públicas, articulado com o planeamento urbanístico e catalisador de inovação territorial.

Esta visão está alinhada com o que Pinto, Nogueira e Edwards (2021) identificam como imperativo de pensar a educação como sistema territorial inteligente, em que a rede escolar se interliga com a especialização regional, a inovação e o desenvolvimento local. Do mesmo modo, o Guião da DGEstE e IGEFE (2021) reforça o carácter dinâmico da carta, sublinhando que esta deve ser permanentemente atualizada, calibrada e sujeita a monitorização contínua, incorporando indicadores que permitam ajustar as decisões ao evoluir das condições territoriais e educativas.

Mais do que um exercício técnico, trata-se de um processo político-estratégico que visa consolidar um sistema territorialmente inteligente, fundado em três pilares: i) inclusão e equidade territorial, assegurando o acesso universal à educação com atenção às realidades geodemográficas e socioeconómicas; ii) sustentabilidade infraestrutural e ambiental, promovendo edifícios escolares eficientes, acessíveis e integrados em estratégias de transição climática; iii) digitalização e inteligência territorial, assente no uso de dados georreferenciados, plataformas colaborativas e indicadores de desempenho que sustentem uma tomada de decisão baseada em evidência, no quadro da *Smart Education* (Zhu, Yu & Riezebos, 2016). Em termos pedagógicos, a investigação sobre Smart Learning Environments propõe modelos operacionais (v.g., SLE-5) que articulam currículo, metodologias, avaliação, papéis e tecnologia com ergonomia e inclusão como eixos transversais, oferecendo um guião útil para o desenho e monitorização da rede (García-Tudela, Prendes-Espinosa & Solano-Fernández, 2021).

Neste sentido, a carta educativa de 3.ª geração deve ser assumida como um documento vivo, estratégico e interativo, capaz de agregar informação, antecipar tendências, articular atores e induzir inovação no território. Mais do que um repositório de mapas, deverá constituir-se como arquitetura de governação educativa que orienta políticas, mobiliza comunidades e responde, com inteligência e agilidade, às transformações sociais, tecnológicas e ambientais em curso (Rothes & Castro, 2014).

Para além destas dimensões, importa salientar que a carta educativa de 3.ª geração inscreve-se num modelo de governação multinível, no qual os municípios, as comunidades intermunicipais e o Estado partilham responsabilidades no planeamento educativo, assegurando coerência territorial e equidade no acesso. Esta visão supõe a construção de plataformas digitais de inteligência territorial que permitam integrar dados em tempo real sobre demografia, mobilidade escolar, indicadores de equidade e sustentabilidade ambiental, reforçando uma lógica de decisão baseada em evidências (Mandinach & Schildkamp, 2021).

Em paralelo, a sua concretização deve alinhar-se com as orientações internacionais, como o *Digital Education Action Plan 2021-2027* da Comissão Europeia ou a Agenda 2030 da UNESCO, que defendem sistemas educativos digitais, inclusivos e resilientes, preparados para enfrentar os desafios globais. Assim, a carta educativa de 3.ª geração não é apenas um

exercício técnico de ordenamento, mas uma peça estratégica de governação educativa inteligente, posicionando a escola como epicentro de inovação, inclusão e sustentabilidade no território. Acresce que a evolução conceptual para *Education/Industry 5.0* convoca uma visão de cooperação humano-máquina, ética digital e sustentabilidade, devendo a carta integrar indicadores de maturidade digital, bem-estar e impacto social (Industry 5.0 in Smart Education, 2024).

5. COMPARAÇÃO INTERNACIONAL

Como vimos, a necessidade de uma carta educativa de 3.ª geração resulta do reconhecimento de que o planeamento educativo deve acompanhar a evolução das políticas territoriais contemporâneas, assentes em modelos *place-based* que articulam educação, equidade e sustentabilidade. Nesta perspetiva, a Organização para a Cooperação e Desenvolvimento Económico (OECD) sublinha que as respostas eficazes são multiescalares, exigem governação coordenada e assentam em evidências robustas, "com monitorização e avaliação consequentes" (OECD, 2025), o que aproxima o desenho das Cartas Educativas das agendas contemporâneas de desenvolvimento regional e das cidades inteligentes, onde a educação é entendida como instrumento estratégico de coesão social e de inovação territorial.

Neste contexto, importa analisar que diversos países têm desenvolvido modelos de planeamento educativo que antecipam, em diferentes graus, os princípios orientadores da carta educativa de 3.ª geração. A análise comparada dessas experiências permite identificar convergências estruturais e compreender de que forma as políticas internacionais têm procurado articular educação, território e justiça social. Mais do que um exercício de descrição, pretende-se mostrar que já existem modelos de inovação educativa com provas dadas e que uma nova geração de cartas educativas pode constituir-se como uma síntese nacional de tendências já testadas noutros contextos. A comparação internacional é aqui mobilizada com função analítica, pois permite identificar mecanismos de equidade territorial, governação colaborativa e o uso inteligente de dados que possam ser traduzidos para o contexto português sem mera transposição normativa (OECD, 2025).

O caso francês, destaca-se pela criação das Zones d'Éducation Prioritaire (ZEP), instituídas em 1982 e mais tarde reformuladas em Réseaux d'Éducation Prioritaire (REP e REP+), como resposta às desigualdades socioeducativas em territórios urbanos vulneráveis. Este modelo procurou combinar diferenciação positiva de recursos com proximidade comunitária, reforçando a autonomia local e a colaboração entre escolas e autarquias (Duru-Bellat & Van Zanten, 2012). Contudo, a literatura mostra que a eficácia das ZEP dependeu fortemente da capacidade de coordenação interinstitucional e da qualidade da liderança local (Bénabou, Kramarz & Prost, 2009), aspetos que se revelam igualmente centrais na organização e operacionalização das cartas educativas de 3.ª geração.

Em Espanha, o desenvolvimento das Zonas de Educação Rural (ZER) constitui outro exemplo relevante do planeamento educativo do território. Através da criação de redes que agrupam pequenas escolas rurais, partilhando recursos humanos, materiais e pedagógicos, as ZER têm promovido solidariedade territorial e equidade no acesso à educação, mitigando os efeitos da baixa densidade populacional (Bolívar & López, 2009). Esta experiência evidencia a importância da gestão em rede, princípio que a carta educativa de 3.ª geração deverá incorporar ao propor uma visão sistémica e colaborativa do território educativo, na qual escolas, municípios e parceiros locais atuam de forma coordenada e sustentável.

Já no contexto canadiano, em particular na Colúmbia Britânica, os modelos das *Community Schools* e dos *Neighbourhood Learning Centres* (NLC) consolidaram a visão da escola como centro de vida comunitária, aberto a múltiplas funções sociais, culturais e formativas. Estes espaços, que operam em articulação com municípios e organizações cívicas, funcionam como *hubs* de aprendizagem e participação, reforçando o sentimento de pertença e a ligação entre educação e desenvolvimento local (Levin & Fullan, 2008; Ministry of Education, British Columbia, 2011). A filosofia subjacente a este modelo, centrada na governação partilhada, na inclusão e na utilização flexível dos recursos públicos, é um dos pontos fulcrais na conceção da carta educativa de 3.ª geração, que propõe a integração da escola numa rede territorial de serviços e oportunidades educativas.

De forma convergente, a UNESCO, através do *Global Network of Learning Cities*, tem defendido a criação de Cidades Educadoras e Aprendentes, nas quais a aprendizagem ao longo da vida é vista como pilar das políticas urbanas integradas (UNESCO Institute for Lifelong Learning, 2017). Este paradigma reforça a ideia de que o planeamento educativo deve ser aberto, participativo e sustentável, e que a educação deve ser entendida como parte de uma ecologia territorial de aprendizagem, lógica que sustenta, mais uma vez, a conceção da Carta Educativa de 3.ª geração.

Assim, a leitura destes casos internacionais demonstra a necessidade da construção de um novo modelo de carta educativa que integre inteligência artificial, dados territoriais em tempo real, participação cidadã e diversidade de ofertas formativas. Mais do que replicar experiências estrangeiras, a carta educativa de 3.ª geração deverá constituir-se como uma síntese evolutiva, incorpora, por exemplo, os princípios da equidade francesa, da solidariedade territorial espanhola e da participação comunitária canadiana, transformando-os num modelo de planeamento educativo inteligente, inclusivo e sustentável, adaptado às especificidades do território nacional.

6. Discussão

A emergência da carta educativa de 3.ª geração representa mais do que uma atualização técnica ou procedimental, traduz uma necessidade estrutural de reformular o modo como Portugal, em particular os municípios e as comunidades intermunicipais, pensam o planeamento educativo e o seu papel na governação territorial. A crescente complexidade das dinâmicas sociais, demográficas e tecnológicas, bem como a transição digital e ecológica que caracteriza o século XXI, colocam novas exigências ao planeamento da gestão pública, que já não pode limitar-se apenas à gestão física da rede escolar. A escola do futuro deve ser pensada como parte de um ecossistema territorial de aprendizagem, conectado, sustentável e centrado nas pessoas, visão que encontra expressão no conceito de *Smart Education*.

O modelo atualmente em vigor evidencia limitações estruturais que se tornaram particularmente visíveis no processo de planeamento das redes de ofertas educativas e formativas (Santos, Alcoforado & Rochette Cordeiro, 2023). Apesar dos progressos alcançados ao nível do diagnóstico territorial e da racionalização da rede escolar, persistem assimetrias relevantes entre municípios, redundâncias na oferta, lacunas na diversificação formativa e uma insuficiente articulação entre as políticas educativas, urbanísticas e de desenvolvimento económico local. Exemplo do que acabámos de referir, a Circular n.º 1/ANQEP/2025 confirma esta realidade ao salientar a necessidade de evitar sobreposição de cursos no mesmo território, reforçar parcerias interinstitucionais e garantir critérios de sustentabilidade e coesão, princípios que evidenciam a urgência de um novo modelo de planeamento educativo inteligente, capaz de integrar informação territorial, antecipar

necessidades de qualificação e assegurar uma gestão mais equilibrada e funcional da rede. Este diagnóstico converge com evidência recente sobre redundâncias e assimetrias na rede de ofertas, bem como com a necessidade de especialização territorial e de cooperação supramunicipal explicitadas na referida Circular e em estudos intermunicipais (Soares, 2023).

Como nota Estanqueiro e Tenedório (2015), o planeamento educativo português "tem oscilado entre a resposta à pressão demográfica e a gestão da infraestrutura, sem se afirmar plenamente como instrumento de desenvolvimento territorial". Essa constatação revela a urgência de um novo paradigma - um planeamento que não apenas corrija o passado, mas prepare o futuro com base em dados, previsões e participação cidadã.

A conceção da carta educativa de 3.ª geração traduz, assim, uma mudança de paradigma no planeamento educativo em Portugal, com implicações diretas na forma como as políticas públicas são concebidas, executadas e avaliadas. O seu carácter inovador decorre da articulação entre a gestão territorial e a visão estratégica da educação como motor de desenvolvimento, reconhecendo a escola enquanto instituição central na coesão social e na construção de comunidades resilientes.

Do ponto de vista das políticas públicas, esta nova geração reforça o princípio da descentralização, consagrado no Decreto-Lei n.º 21/2019, de 30 de janeiro, ao atribuir aos municípios uma responsabilidade acrescida na definição da rede e dos equipamentos educativos. Este movimento exige uma governança mais próxima, capaz de conjugar a autonomia local com a coerência nacional, numa lógica de governação multinível, tal como defendem a OECD (2024) e a União Europeia nas suas estratégias para o desenvolvimento territorial sustentável. Essa descentralização implica, porém, capacitação técnica e institucional, sob pena de se perpetuarem desigualdades territoriais no acesso à educação de qualidade.

Neste quadro, a carta educativa de 3.ª geração propõe-se como um instrumento de planeamento inteligente, alicerçado na integração de dados em tempo real, sistemas de georreferenciação, plataformas interoperáveis e ferramentas de inteligência artificial. Estas permitem antecipar cenários, prever fluxos demográficos, otimizar recursos e adaptar a rede educativa às transformações sociais e económicas. Contudo, a incorporação da tecnologia por si só não basta, sendo essencial que esta se oriente por um propósito público de inclusão, transparência e eficiência, de modo a assegurar que o conhecimento gerado pelas ferramentas digitais se traduza efetivamente em decisões políticas e educativas mais informadas e justas (Estratégia Digital Nacional, 2025; Plano de Ação para a Educação Digital, Comissão Europeia, 2021–2027; Referencial de Educação para a Transparência e Integridade, DGE, 2025). Para além das componentes administrativas e territoriais (*smart administration*), é crucial prever ambientes de aprendizagem adaptativos (*smart classroom/pedagogy*) e sistemas de avaliação contínua (*smart assessment*) suportados por IoT e learning analytics, com salvaguardas de privacidade e ética (Hasan, 2025; NEJPP, 2023).

A governação local assume, neste contexto, um papel determinante. Como sublinham Machado e Alves (2014), a administração local da educação deve ser entendida como "um processo partilhado, em que o município assume uma função de liderança articuladora, mas sempre em diálogo com as comunidades educativas". A carta educativa de 3.ª geração reforça esta visão ao promover a participação cidadã e a corresponsabilização dos diferentes agentes do território, designadamente as autarquias, escolas, famílias, associações e parceiros sociais, num processo de planeamento que deixa de ser vertical e passa a ser colaborativo e iterativo.

Todavia, esta transição coloca desafios concretos. Em primeiro lugar, a necessidade de formação e especialização dos técnicos dos municípios, para que possam interpretar e aplicar dados complexos com rigor e sentido estratégico. Em segundo lugar, a interoperabilidade dos sistemas de informação, condição essencial para assegurar a consistência entre plataformas educativas, urbanísticas e sociais. E, em terceiro lugar, o fortalecimento da cultura de monitorização e avaliação contínua, ainda pouco enraizada na administração pública portuguesa, mas essencial para a credibilidade e atualização das Cartas Educativas (OECD, 2025).

A discussão em torno da 3.ª geração das cartas educativas evidencia, assim, que a *Smart Education* não é apenas uma dimensão tecnológica, mas acima de tudo, uma abordagem sistémica que integra educação, território, inovação e cidadania. Para além da digitalização dos processos, está em causa a construção de uma nova cultura de planeamento, baseada em evidências, colaboração e sustentabilidade. Só assim será possível consolidar um modelo de governação educativa inteligente, que não apenas otimize a gestão da rede escolar, mas que também contribua para a redução das desigualdades, a valorização da diversidade cultural e a promoção de territórios mais coesos, inclusivos e sustentáveis. Deste modo, a carta educativa de 3.ª geração deve explicitar uma arquitetura de governação de dados (*data governance*) com interoperabilidade, dados abertos e participação, alinhada com referenciais internacionais e com a criação de valor público (Castro & Rothes, 2014; Open Praxis, 2023; Smart Cities, 2023).

7. CONCLUSÃO

A análise desenvolvida ao longo do artigo permite afirmar que a transição para uma carta educativa de 3.ª geração não se reduz a uma mera atualização técnica ou administrativa do instrumento existente, configurando-se mais como uma necessidade estrutural e estratégica que resulta da confluência de três ordens de fatores estreitamente interligadas. Em primeiro lugar, torna-se evidente a insuficiência do modelo de 2.ª geração para dar resposta à crescente complexidade territorial e social do sistema educativo, mantendo-se ainda demasiado vinculado a uma lógica predominantemente infraestrutural e a um modelo de governação centralizada, que limita a autonomia local e a capacidade de adaptação dos territórios às dinâmicas emergentes. Em segundo lugar, a dupla transição digital e ecológica, que caracteriza o atual contexto das políticas públicas, redefine profundamente os modos de planear, decidir e avaliar, impondo a adoção de sistemas de informação integrados, suportados em dados fiáveis, interoperáveis e permanentemente atualizados, bem como a construção de mecanismos de participação alargada e colaborativa entre os diversos atores institucionais e comunitários, e por fim, assume-se como determinante a consolidação, a nível internacional, de uma *Smart Education* de matriz humanista, concebida como um paradigma que procura conciliar a inovação tecnológica e pedagógica com os princípios da justiça social, da inclusão e da sustentabilidade territorial, reafirmando a educação como pilar central da coesão e do desenvolvimento dos territórios. No plano histórico-institucional, a literatura mostra que as cartas educativas, tal como foram concebidas e executadas, oscilaram entre a racionalização do parque escolar e uma territorialização pouco consequente, com défices de participação e de monitorização que limitaram a sua capacidade transformadora (Castro & Rothes, 2014; Rosa, 2022). Por mais relevantes que tenham sido os progressos no diagnóstico e na reorganização da rede, mantiveram-se assimetrias entre municípios, fraca integração com políticas urbanas e culturais e uma acentuada dependência de orientação central, o que legitima a mudança de paradigma proposta (Soares, 2023). Esta necessidade de reformulação é, aliás, sublinhada na Circular n.º 1/ANQEP/2025, quando reclama coerência, especialização territorial e concertação de

redes formativas, objetivos que só podem ser alcançados com planeamento inteligente, dados partilhados e governação colaborativa (ANQEP, 2025).

No plano internacional e estratégico, os referenciais de política pública insistem na governação multinível baseada em evidência, na avaliação consequente e na lógica *place-based*, aproximando o planeamento educativo das agendas de desenvolvimento regional e de cidades inteligentes (OECD, 2024; OECD, 2025; UNESCO Institute for Lifelong Learning, 2017; Smart Cities, 2023). estes princípios encontram tradução operativa em experiências como as *community schools* e os *neighbourhood learning centres* canadianos, que colocam a escola como hub comunitário e infraestrutura cívica, articulando educação, cultura, desporto e serviços sociais num mesmo ecossistema de aprendizagem (Ministry of Education, British Columbia, 2011; Levin & Fullan, 2008). A carta educativa de 3.ª geração que defendemos filia-se nesta tradição, mas não a replica, adapta-a às especificidades portuguesas, ligando o conselho municipal de educação, as comunidades intermunicipais, a administração central e os agentes locais num ciclo contínuo de diagnóstico-deliberação-monitorização.

No plano pedagógico e organizacional*,* a *smart education* não se resume à digitalização de processos, mas sim configurando-se como um ecossistema responsivo e centrado nas pessoas, suportado por governação informada com dados, onde se combinam infraestrutura tecnológica, inovação pedagógica e cultura de colaboração (Open Praxis, 2023; NEJPP, 2023). A investigação sobre *smart learning environments* oferece modelos práticos, como o sle-5, que articulam currículo, metodologias, avaliação, papéis e tecnologia com ergonomia e inclusão enquanto eixos transversais, propondo uma gramática útil para o desenho da rede educativa e para a sua monitorização (García-Tudela, Prendes-Espinosa & Solano-Fernández, 2021). Com coerência, a carta de 3.ª geração deve explicitar, desde logo, arquiteturas de dados, processos de interoperabilidade e mecanismos de participação, de forma que a informação recolhida em tempo real se traduza em decisões públicas melhores, mais justas e mais transparentes, não apenas em relatórios retrospetivos.

No plano tecnológico e prospetivo, as revisões recentes sublinham que a integração entre iot, inteligência artificial e análise preditiva permite evoluir para a administração inteligente, salas e pedagogias adaptativas e avaliação contínua (*smart administration, smart classroom/pedagogy, smart assessment*), com potencial para antecipar tendências demográficas, otimizar recursos, identificar precocemente riscos de insucesso e apoiar a diferenciação pedagógica (Hasan, 2025). Contudo, esta transformação só é virtuosa quando integra princípios éticos, garantias de privacidade e segurança, formação de profissionais e transparência algorítmica, pois de contrário, arrisca-se a reproduzir assimetrias ou a tornar-se tecnocrática (NEJPP, 2023; Open Praxis, 2023).

É também neste sentido que o debate em torno de industry/education 5.0 reforça uma visão centrada no humano, cooperativa e socialmente sustentável, que liga inovação tecnológica, bem-estar e valor público, oferecendo uma matriz para políticas educativas que conciliem eficiência e dignidade (*Industry 5.0 in Smart Education*, 2024; UNESCO, 2021).

Em termos de implicações operacionais, a carta educativa de 3.ª geração que propomos deve consagrar, de forma clara e verificável, quatro compromissos: i) governação colaborativa, com papéis definidos para municípios, comunidades intermunicipais e administração central, em articulação com escolas e parceiros locais; ii) integração sistémica de dados, com padrões de interoperabilidade, *data governance* e dados abertos orientados à decisão; iii) ecossistemas locais de aprendizagem, que articulem rede escolar, bibliotecas, equipamentos culturais e desportivos, laboratórios e associações, reforçando a pertença

comunitária; iv) monitorização e avaliação contínuas, com indicadores públicos e auditáveis sobre equidade territorial, maturidade digital, bem-estar, sustentabilidade ambiental e impacto social, em linha com os ODS e com o Portugal 2030 (OECD, 2024; Smart Cities, 2023; ANQEP, 2025).

Sob esta configuração, a carta educativa deixa de ser um documento estático ou um instrumento de mera gestão do edificado e passa a operar como ferramenta de governação educativa inteligente, capaz de alinhar políticas, recursos e pedagogias numa mesma direção de equidade, qualidade e sustentabilidade.

Em síntese, a proposta de carta educativa de 3.ª geração articula uma leitura crítica do passado com um desenho claro de futuro, responde às limitações identificadas pela investigação nacional (centralização, tecnicismo, baixos níveis de participação), incorpora referenciais internacionais de governação e aprendizagem ao longo da vida e integra capacidades digitais ao serviço do bem comum. Como tem sido salientado na reflexão pedagógica recente, "a escola pública só fará sentido se se afirmar como espaço central da comunidade e como catalisador de inovação e participação" (Nóvoa, 2019), pelo que a carta que propomos é precisamente o instrumento que permite dar forma territorial a esta ambição, convertendo a *smart education* num projeto público de desenvolvimento humano e coesão territorial.

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Beyond public and private: legal status and ownership as determinants of institutional differentiation in higher education

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Abstract

This paper examines how legal status and ownership contribute to the differentiation of higher education institutions (HEI), using the Portuguese higher education (HE) system as an empirical context. It aims to move beyond the conventional public–private dichotomy by demonstrating that legal status and ownership are key variables in explaining the diversity and behaviour of private HEI. The study adopts a qualitative research design based on documentary analysis, combining two analytical axes: legal-institutional mapping and ownership mapping. The analysis draws on official and institutional sources, including the Portuguese Official Gazette, the Justice Portal, and the SABI database, covering the period from 2004 to 2021. This allows for both cross-sectional and longitudinal analysis. The findings reveal that private HE is characterised by a high degree of organisational heterogeneity, with multiple legal forms of ownership coexisting. This diversity stems directly from the legal framework governing the sector. The study also shows that ownership in HE should be understood as a system of control rather than merely a formal property relationship. A central finding is the pivotal role of the founding entity in the Portuguese private HE sector, where institutions generally lack autonomous legal personality and effective control is exercised by founding entities that establish and own them.

Keywords: Legal status; Ownership, Institutional differentiation, Private higher education, Portugal

1. Introduction

The distinction between public and private higher education (HE) has, over recent decades, constituted a central axis of research in the field, reflecting concerns related to governance, funding, and regulation of education systems (Levy, 2011, 2018; Levy & Zumeta, 2011; Parada, 2010). However, despite its analytical relevance, this distinction has often been operationalised through binary categories that oversimplify the empirical reality of contemporary systems, which are increasingly characterised by institutional diversity and the emergence of hybrid organisational forms (Amaral & Magalhães, 2023; Diogo et al., 2015; Veiga et al., 2015).

The expansion of private HE, particularly since the second half of the twentieth century, has significantly contributed to the reconfiguration of national systems. This process has been associated with what some authors describe as the decline of the public monopoly in HE provisions (Bertolin, 2011; Levy, 2012; Levy & Zumeta, 2011). It has also led to a diversification of institutional models, including different legal forms, governance structures, and strategic orientations, shaped by both market dynamics and evolving regulatory frameworks.

Despite these developments, much of the literature continues to privilege classifications based on funding sources, institutional missions, or profit orientation (Bartelse & van Vught, 2009; Lepori, 2022; Meek et al., 2000). While relevant, these approaches are often insufficient to capture the structural differences that shape institutional functioning and organisational

behaviour. The legal framework plays a crucial role in defining the conditions under which institutions operate (Ferreira-Fernandes, de la Torre García, et al., 2025), thereby influencing their behaviour. This limitation is particularly relevant in the context of broader transformations affecting HE systems worldwide, because despite the rich literature on HE, there is a lack of research on the legal entities under which the HEI are organized (Holmén & Ringarp, 2023). Similarly, the literature on academic capitalism highlights the growing influence of market mechanisms, competition, and resource-seeking behaviour among HEIs (Qureshi & Khawaja, 2021; Song, 2019; P. Teixeira et al., 2014; P. N. Teixeira et al., 2012). Nevertheless, less attention is given to the legal and ownership structures that define who ultimately controls institutional assets, appoints governing bodies of HEI, and exercises decision-making rights. This perspective also complements the growing literature on entrepreneurial universities, often associated with institutional flexibility, diversification, innovation capacity, and strategic responsiveness to external pressures (Chang et al., 2016; Piurcosky et al., 2021; Slaughter & Leslie, 1997). However, the ability of institutions to adopt entrepreneurial strategies is frequently conditioned by their legal status and ownership arrangements. Understanding ownership therefore contributes not only to the analysis of governance but also to the explanation of why institutions differ in their capacity to act entrepreneurially.

In this context, this study argues that legal status and ownership constitute fundamental analytical variables for understanding institutional differentiation in HE. Rather than focusing solely on functional or financial characteristics, this approach emphasises the structural conditions that define organisations. Legal status determines key dimensions such as asset ownership, degrees of autonomy, employment regimes, and tax conditions. These dimensions shape ownership models, which in turn influence control mechanisms and organisational strategies.

These dimensions configure the framework within which ownership models emerge, directly influencing control mechanisms and organisational strategies. In this sense, ownership should be understood not merely as a formal property relationship, but as a system of institutionally and legally structured control. Building on this perspective, this study proposes a reconceptualisation of ownership in HE, understanding it as a hidden strategic determinant whose analysis enables a deeper understanding of governance dynamics, institutional differentiation, and organisational behaviour. While the public-private distinction remains analytically useful, it increasingly fails to capture the diversity of organisational arrangements observed within contemporary HE systems. Institutions classified within the same sector may differ substantially in their legal status, ownership configurations, governance arrangements and strategic capacities. Consequently, relying exclusively on this dichotomy risks obscuring the structural mechanisms that shape institutional behaviour and differentiation.

Empirically, the study focuses on the Portuguese HE system, which constitutes a particularly relevant case for this type of analysis. The Portuguese system is characterised by a high degree of diversity in legal forms, including public institutions under public law, public foundations governed by private law, private institutions operating under different legal forms (cooperatives, associations, foundations, and commercial companies), and religious entities with a specific legal status. This diversity results from a legislative trajectory marked by successive reforms, which have enabled the coexistence of multiple institutional models (Ferreira-Fernandes, García, et al., 2025). From an analytical perspective, the Portuguese case also has several notable features. These include the centrality of the founding entity in the private HE sector, the absence of autonomous legal personality for private HEI, and the

coexistence of various governance and funding systems. These characteristics make the Portuguese system an ideal context to analyse the legal status and ownership profiles of HEI.

The central research question guiding this study is: How do legal status and ownership structures explain institutional differentiation and sectoral reconfiguration in Portuguese private HE?

Based on this question, the study has two main objectives. Firstly, it analyses the extent to which the distinction between public and private HE translates into structural differences in terms of ownership and HEI´s operating conditions and autonomy. Secondly, it aims to demonstrate that the private HE sector is not homogeneous but rather comprises a diverse institutional landscape in which different legal forms are associated with distinct ownership and control models. In doing so, the article contributes to literature by proposing an integrated approach that brings together legal status and ownership, offering a new perspective on institutional differentiation in HE. This approach makes it possible not only to understand the observed diversity, but also to identify the structural mechanisms that produce it. It also contributes to ongoing debates on governance, marketisation, institutional diversity, and organisational change in HE by highlighting how legal and ownership structures shape HEI behaviour.

The article is structured as follows: Section 2 develops the conceptual framework, exploring the relationship between legal status and ownership; Section 3 presents the methodology and the data used; Section 4 analyses ownership models in Portuguese PHE in light of the international literature. Finally, section 5 presents the conclusions and implications of the study.

2. Conceptual Framework: Legal Status, Ownership and Institutional Differentiation

The analysis of institutional differentiation in HE has traditionally been structured around the distinction between public and private institutions. This dichotomy, while useful as a starting point, can be questioned as HE systems become more complex, diversified, and permeable to different organisational logics (Holmén & Ringarp, 2023; Jamshidi et al., 2012). The expansion of private HE, the emergence of hybrid forms and the growing influence of market mechanisms have contributed to the rise of institutional configurations that do not fit easily within traditional categories. In this context, the literature has recognised more analytical approaches that can capture not only the formal differences between institutions, but also their underlying governance and control structures. A significant limitation of existing approaches is their tendency to prioritise functional criteria, such as sources of funding or institutional mission (Buckner, 2017; Buckner & Zapp, 2021), over structural dimensions that influence organisational functioning, such as the legal forms and regulatory environment. It is within this framework that the concept of ownership assumes relevance.

Although widely used in the analysis of economic organisations, ownership has been relatively underexplored in the context of HE (Okyere et al., 2026; Zhang, 2006), often being treated implicitly or reduced to distinction between public and private property. As a result, the concept is rarely examined as an independent analytical variable capable of explaining institutional behaviour. This omission is particularly significant because ownership determines who ultimately possesses control rights, allocates resources, appoints governing bodies, and defines strategic priorities. Consequently, institutions operating under similar funding arrangements or pursuing similar missions may nevertheless exhibit substantially

different patterns of organisational behaviour due to differences in legal status and ownership structures.

From a theoretical perspective, ownership can be conceptualised as the set of residual control rights, that is, the rights that allow decisions to be made in situations not specified by formal contracts. This approach, developed within the framework of the theory of the firm (Hart & Moore, 1990), makes it possible to move beyond a simplistic view of ownership as mere asset holding, emphasising instead the dimension of effective control. In the context of private HE, this distinction is particularly relevant, insofar as formal ownership does not always coincide with organisational control.

However, unlike in other sectors, ownership in HE cannot be analysed in isolation, but must be understood within the framework of the legal status of HEI and their founding bodies. Legal status constitutes the mechanism through which the law defines the nature of organisations, establishing their rights, obligations, and limits of action. As argued by Bernasconi (2011), the law plays a central role in the construction of institutional categories, determining which organisations are classified as public or private and outlining the consequences of that classification.

In this sense, legal status should not be understood as a merely classificatory variable, but as a structural determinant that conditions the scope for organisational action. More specifically, legal status defines fundamental dimensions such as ownership of assets, degrees of institutional autonomy, human resource employment regimes, and tax conditions. These dimensions directly influence organisational incentives and the strategies adopted by institutions. The relationship between legal status and ownership becomes particularly evident when analysing the differences between public and private HEI (Ferreira-Fernandes, de la Torre García, et al., 2025). In public HEI, assets typically belong to the organisation itself, which holds autonomous legal personality and enjoys significant degrees of administrative and financial autonomy. By contrast, in the Portuguese case, private HEI do not possess independent legal personality, with control exercised by founding entities that hold the assets and the rights to strategic decision-making. This configuration entails a separation between the academic unit and the control structure, with profound implications for governance and organisational behaviour.

Beyond the distinction between public and private, legal status also makes it possible to understand the internal diversity of the private sector. The literature on private HE has increasingly highlighted the heterogeneity of this sector, identifying different types of institutions based on their orientation (for-profit vs non-profit), mission, or governance structure (Levy, 2006; 2018). However, these typologies tend to underestimate the role of legal forms in shaping these differences.

In the case of founding bodies of private HEI, different legal forms, such as cooperatives, foundations, associations, or commercial companies, are associated with distinct ownership regimes, different control mechanisms, and varying constraints on the distribution of profits (D. Meira, 2021; D. A. Meira & Ramos, 2019; D. Meira & Ramos, 2022). For example, cooperatives are based on principles of democratic governance and collective ownership (D. A. Meira, 2018), whereas commercial companies are grounded in capital ownership and the maximisation of returns for investors (Stout, 2017). Foundations, in turn, are characterised by the irrevocable allocation of assets to specific purposes, thereby limiting the private appropriation of results (Gonçales, 2014). These differences reflect not only organisational choices, but above all the legal framework that defines the possible forms of organisation.

In this sense, legal status can be understood as a mechanism of institutional differentiation, structuring ownership and shaping organisational strategies.

This perspective aligns with broader approaches to HE systems, which emphasise the importance of institutional differentiation for system efficiency and diversity (Kwiek, 2015). However, by introducing legal status of ownership as a central variable, the present study proposes an alternative interpretation, in which differentiation is understood not only as the result of strategic choices or market dynamics, but also because of legally defined constraints and opportunities of entities legal form. Based on these premises, the article proposes an integrated analytical framework in which legal status constitutes the structural variable, ownership represents the configuration of control that emerges from this framework and organisational behaviour reflects the strategies adopted by institutions within the group in a context of coopetition. This framework makes it possible to understand not only the differences between institutions, but also the mechanisms that produce them, thereby offering a more robust theoretical foundation for the analysis of institutional differentiation in HE.

3. Methodology and Data

The present study adopts an exploratory qualitative approach, based on documentary analysis and the institutional reconstruction of the private HE sector in Portugal. This methodological strategy is particularly well suited to the object of study, as the central aim is to understand the relationship between legal status, ownership models, and organisational control structures, dimensions that are formally defined and operationalised through legal and institutional frameworks.

The choice of a qualitative approach is also justified by the nature of the phenomenon under analysis. Ownership in HE, understood as a system of control rights, is not directly observable through simple quantitative indicators, requiring instead an in-depth analysis of legal structures, organisational forms, and underlying institutional relationships. In this sense, documentary analysis constitutes a fundamental tool for accessing the formal configuration of HEI and the rules that govern their functioning. Documentary sources provide reliable information regarding formal legal arrangements; however, they may not fully capture informal patterns of influence, personal networks, or governance practices operating beyond statutory provisions. Consequently, the study should be interpreted as an analysis of formal ownership structures rather than a comprehensive account of all dimensions of organisational control.

The methodology is structured around two complementary analytical axes. First, a legal-institutional mapping is conducted, consisting of the identification and classification of HEI according to their legal form. This process makes it possible to reconstruct the institutional architecture of the system, identifying different organisational categories and the key features that define them. Second, an ownership mapping is developed, aimed at identifying founding entities and associated control structures, thereby enabling an analysis of who effectively holds property rights and strategic decision-making authority.

The database was constructed through the systematic identification of all recognised PHEI operating during the study period and their respective founding entities. Data collection is based on the triangulation of official and institutional documentary sources, to ensure the reliability and consistency of the information. The main sources used include the Official Gazette (Portugal), where legal acts relating to the creation, recognition, modification, and closure of HEI are published; the Justice Portal (Portugal), particularly online records of

corporate acts, which allow for the characterisation of the legal form of founding entities, and the SABI database (Bureau van Dijk), used to gather information on entities of a corporate nature, including Company Registration Number (NIPC), ownership structures and shareholdings. In addition, institutional websites of HEI were consulted, as well as relevant legislation of the legal framework for HEI in Portugal.

The primary unit of analysis consists of private HEI in Portugal, considered in conjunction with their respective founding entities. This methodological choice stems from a structural characteristic of the Portuguese system: private HEI generally do not possess autonomous legal personality, being legally embedded within the entities that establish them. Consequently, the analysis of ownership requires a particular focus on founding entities as the holders of property rights and control.

The temporal scope of the study covers the period from 2004 to 2021. This delimitation makes it possible to capture a particularly relevant phase in the evolution of the system, including both the period before and after the introduction of the Legal Framework for Higher Education Institutions (RJIES, 2007), the creation the Higher Education Assessment and Accreditation Agency (A3ES), and the implementation of the evaluation and accreditation regime for HEI and their study programmes, as well as more recent dynamics of institutional reconfiguration (Ferreira-Fernandes, Machado-Taylor, et al., 2025).

A central element of the analysis lies in the incorporation of a longitudinal dimension, through the comparison of the distribution of HEI by legal typology in the years 2004 and 2021. This analysis makes it possible to identify patterns of stability, change, and concentration within the sector, providing empirical evidence on the evolution of ownership models. It allows for the assessment of whether certain legal forms have become more predominant, whether processes of consolidation have occurred, or whether new institutional configurations have emerged.

The systematisation of the data was carried out through the construction of an original structured database, integrating information on HEI, founding entities, and their legal characteristics. This database enabled the development of descriptive and comparative analyses, as well as the identification of relationships between entities and potential institutional groups.

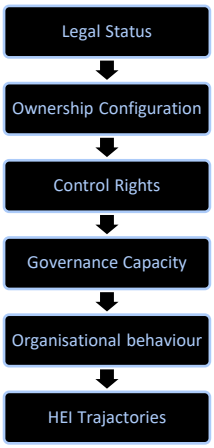
From an analytical perspective, the study combines three levels of analysis. First, a descriptive analysis, which characterises the distribution of HEI by legal form and identifies the main ownership typologies. Second, a relational analysis, which examines the links between institutions and founding entities, making it possible to identify patterns of control concentration and the existence of institutional groups. Third, an interpretative analysis, which relates the empirical findings to the theoretical framework, exploring how legal status shapes ownership and organisational behaviour.

It is important to emphasise that the aim of the study is not to produce statistical generalisations, but rather the exploration of structural relationships that may be relevant to other contexts. In this sense, Portugal is used as an empirical case that illustrates particularly clearly the relationship between legal status and ownership, due to the diversity of legal forms and the specificity of its institutional framework.

The analytical model proposed in this study (Figure 1) explains institutional differentiation in HE through the interaction between legal status, ownership, and organisational behaviour. Legal status determines the organisational forms available to higher education institutions

and their founding entities, shaping the distribution of property rights and decision-making authority. These ownership configurations influence governance capacity, strategic choices, and the ability of institutions to respond to regulatory and competitive pressures. Organisational outcomes, such as expansion, consolidation, or decline, should therefore be understood not only as the result of managerial decisions or market dynamics but also as consequences of legally structured ownership arrangements. By linking these dimensions, the model provides a framework for understanding how institutional diversity is produced and sustained within HE systems.

Figure 1 – *Analytical model*



Source: Authors' own elaboration

This analytical sequence provides a transferable framework that may be operationalised in future comparative studies by examining the relationship between legal forms, ownership structures and organisational outcomes.

Despite the robustness of the adopted approach, the study presents some limitations. First, the analysis relies predominantly on formal and documentary sources, which reflect legal structures but may not fully capture informal dynamics of control and governance. Second, information on ownership structures in the private sector is not fully transparent, which limits the comprehensive identification of relationships between organisations. Finally, the focus on a single national context limits the generalisability of the findings, although it enables an in-depth analysis of institutional dynamics.

4. Ownership Models in Private Higher Education in Portugal

An empirical analysis of the private HE sector in Portugal reveals a structural pattern throughout the system: the coexistence of multiple legal forms of founding bodies. This results in various ownership structures and distinct organisational control structures. Portugal is characterised by the coexistence of various legal forms, including cooperatives, associations, foundations, commercial companies, and religious entities.

This diversity is not the result of spontaneous or contingent development, but rather of a legal framework that has allowed multiple types of entities to enter the sector as providers of higher education since its liberalisation in the 1970s and 1980s (Ferreira-Fernandes, García, et al., 2025). In this sense, the observed heterogeneity is a direct consequence of the regulatory framework governing the sector, which reinforces the central argument of this article: that legal status is a structural determinant of ownership.

The structuring role of legal status becomes more evident when the key legal distinctions between public and private HEI are considered, as summarised in Table 1. These distinctions

affect fundamental organisational dimensions such as governance, control, funding, asset ownership, accountability mechanisms and the legal framework governing institutional activity, and go beyond mere formal classification (Ferreira-Fernandes, de la Torre García, et al., 2025).

Table 1 — *Key Legal Features of Higher Education Institutions in Portugal*

	Public HEI		Private HEI	
Legal Status	**Legal person under public law**	**Public foundation under private law**	**Private-law legal entities**	**Religious corporate body**
Services/Core Mission	Higher education and related activities (research and extension activities)			
Academic degrees and diplomas of higher education	Public and private HEI confer the academic degrees of bachelor, master, and doctor. In polytechnic HEI is also conferred the diploma of professional superior technician is also conferred. Higher education institutions may also award other diplomas not conferring academic degrees. It is reserved for higher education institutions to use the terms 'graduate education', 'postgraduates', and others that suggest that they are in question higher education. There is no distinction between the public and private sectors.			
Requirements of quality assessment, accreditation of study cycles, and authorization of operation	There is no distinction between the public and private sectors.			
Regime/Law	Public (subject to the regime applicable to other legal persons governed by public law of an administrative nature)	Public sector with a private law regime (mainly at the level of asset and financial management, at the level of hiring human resources, and in the acquisition of goods and services).	Governed by private law in all matters not contrary to the Legal regime of higher education institutions (RJIES) - Law No. 62/2007 of 10 September (or other applicable legislation)	HEI has its own legal personality Governed by Concordate between the Portuguese Republic and the Holy See - Resolution of the Assembly of the Republic No. 74/2004 of 16 November
Legal form	* Legal person under public law * Legal person under public law - Chief of the General Staff of the Armed Forces - CEMGFA (Policial and Militar HEI)	Private-law public foundation	*Association *Cooperative *IPSS (Private social solidarity institution) Joint Stock Company *Local government (with no corporate status) *Non-governmental organisation (ONG) *Private foundations *Private limited company *Sole proprietorship by shares	Religious corporate body
Legal body	HEI has its own legal personality	HEI has its own legal personality	The founding bodies of private HEI are the legal persons. TheHEI do not have their own legal personality	HEI has its own legal personality
Status of Public Utility	Yes (Status is automatically acquired)		No Portuguese associations or cooperatives (private non-profit legal persons) may request public utility status, but any has such distinction from the Administration.	Yes (status automatically acquired by Article 2 of Decree-Law 128/90 of 17 April)

Patrimony	The set of assets and rights that have been transferred to it by the State or other entities, public or private, for the the accomplishment of its purposes (art. 109 of RJIES)	* Assets of the IES. In the case of an organic unit, by the assets of the institution that were specifically allocated to its attributions (Article 130, No. 1 of RJIES); * Assets ceded by the state or other entities after the formation of the foundation (Article 130, Nos. 2 and 3 RJIES).	The HEIs do not have their own assets. All assets and rights belong to the founding body, which has to create and ensure the conditions for the normal operation of the IES and allocate adequate facilities and equipment, as well as the necessary human and financial resources.	The Catholic University's patrimony is constituted by all assets and rights that belong directly to it (assets transferred by the Portuguese Catholic Institute, assets donated or left to the Church, or to any of its organisations or authorities with the express mention that they should be applied to the purposes of the Catholic University).
Initiative of creation	By initiative of the state (Art. 54 of RJIES)	The conversion of a public collective person into a public foundation under public law is done by the initiative of the HEI through a reasoned proposal to the government by the rector (or president), approved by the general council by the absolute majority of its members (Article 129, No. 1 of RJIES). Institutional change may also have the goal of creating a new institution as a result of the recomposition of organic units from various public higher education institutions and public or private research and development institutions. Institutional change may also have as its object the creation of a new institution resulting from the recomposition of organic units of various public higher education institutions and public or private research and development institutions.	By entities that have the legal form of: * a foundation, association or cooperative constituted specifically for this purpose, as well as by non-profit cultural and social entities which include higher education among their purposes; * private limited company or a public limited company set up specifically for this purpose (art. 32 RJIES)	By initiative of the Holy See/ Catholic University
Relationship between State and the IES	HEIs under state tutelage and supervision	Based on the contractualisation of multi-annual objectives. State supervision	State supervision	State supervision

Main governing bodies	* General Council * Rector, President or Director * Management Board * Scientific or technical-scientific council * Pedagogical Council	The Board of Trustees, which consists of five external trustees appointed by the institution, The government, upon the institution's proposal, will serve for a period of 5 years. * Management Board (appointed by the Board of Trustees, upon proposal by the rector, director, or president) * Other bodies of public higher education institutions (Article 133, No. 1 of RJIES).	* The founding body's governing bodies * Rector, President, or Director * Management Board * Scientific or technical-scientific council * Pedagogical Council * General Council	The two higher hierarchical organs of the UCP are the Congregation for Catholic Education and the Portuguese Episcopal Conference. UCP's individual governing bodies are the Grand Chancellor and the Rector, with one or more Vice-Rectors. Collegiate governing bodies of UCP. Rector's Council and the Council of Financial Management. Basic Unit Management Body: Director, the Governing Board, and the Scientific Council
Management paradigms	Public Management	Private management	Private management	Private management
For profit	Not for profit		Depending on the legal form of the founding body, they may or may not be for profit	Not for profit
IES autonomy	* Pedagogical, scientific and cultural autonomy * Patrimonial, administrative and financial autonomy		* Pedagogical, scientific and cultural autonomy * No patrimonial, administrative and financial autonomy (competences of the founding body).	Statutory, scientific, pedagogical, patrimonial, administrative, financial and disciplinary autonomy
Tax Exemptions	Exempt, under the same terms as the state, from taxes, charges, costs, emoluments, and stamps		No tax exempt regime	Exemption from: * State and local authority taxes, contributions, or fees, including stamp duty; * Preparation, costs, and justice tax in cases that take place in any court where it is a main party, assistant, or intervening party.
Financing	Allocations from the General State Budget and through own resources (art. 115 of RJIES)	Allocation from the State through multi-annual contracts (not less than less than 3 years - art. 136 no. 1 of RJIES) and throught own resources.	Own resources.	Own resources. The Government may grant subsidies to the Catholic University (article 11 Decree-Law 128/90 of 17/04)

Employment Relationships/ Contractual Regime of Academic Staff	Public employment (civil service regime) - Main Legislation: General Law of Public Service Employment - LTFP	* Public employment (civil service regime) - Main Legislation: General Law of Public Service Employment - LTFP and/or * Individual employment contract (safeguarding the civil service regime for lecturers who already enjoyed this regime before the transformation into a foundation - article 134 no. 4 of RJIES) - Main Legislation: General Law of Public Service Employment and Labour Code - Law n.º 7/2009 of 12/02.	* Individual employment contract - Main Legislation: General Law of Public Service Employment and Labour Code (Law No. 7/2009 of 2 February) and subsidiarity/complementarily * Service Provision Contract - Main Legislation: Decree-Law No. 47344 of November 25, 1996	Individual employment contract - Main Legislation: General Law of Public Service Employment and Labour Code - Law n.º 7/2009 of 12/02 and subsidiarity/complementarily * Service Provision Contract - Main Legislation: Decree-Law No. 47344 of November 25, 1996
Regulation of the Academic Career	* Status of the Scientific Research Career - Decree - Law No. 124/99 of 20 April * Statute of the University Teaching Career, Decree-Law No. 448/79 of 13 November * Statute of the Polytechnic Teacher Career - Decree-Law No. 207/2009 of 31 August		No specific regulation of Academic Carrer (shall be paralell to the he counterparts in public HEI and must hold the same qualifications) - Law unpublished	Has its own status of academic career. This statute follows the principles and norms of the public sector and the norms enshrined in the Code of Canon Law, the specific documents emanating from the Congregation for Catholic Education, and the statutes of the Portuguese Catholic University (UCP).
Academic profissional categories and required qualifications	Definied by Regulation of Academic Carreer		Law unpublihed	Definied by Regulation of Academic Carreer

	Public HEI		**Private HEI**	
Legal Status	**Legal person under public law**	**Public foundation under private law**	**Private-law legal entities**	**Religious corporate body**
Services/Core Mission	Higher education and related activities (research and extension activities)			
Academic degrees and diplomas of higher education	Public and private HEI confer the academic degrees of bachelor, master, and doctor. In polytechnic HEI is also conferred the diploma of professional superior technician is also conferred. Higher education institutions may also award other diplomas not conferring academic degrees. It is reserved for higher education institutions to use the terms 'graduate education', 'postgraduates', and others that suggest that they are in question higher education. There is no distinction between the public and private sectors.			
Requirements of quality assessment, accreditation of study cycles, and authorization of operation	There is no distinction between the public and private sectors.			

Regime/Law	Public (subject to the regime applicable to other legal persons governed by public law of an administrative nature)	Public sector with a private law regime (mainly at the level of asset and financial management, at the level of hiring human resources, and in the acquisition of goods and services).	Governed by private law in all matters not contrary to the Legal regime of higher education institutions (RJIES) - Law No. 62/2007 of 10 September (or other applicable legislation)	HEI has its own legal personality Governed by Concordate between the Portuguese Republic and the Holy See - Resolution of the Assembly of the Republic No. 74/2004 of 16 November
Legal form	* Legal person under public law * Legal person under public law - Chief of the General Staff of the Armed Forces - CEMGFA (Policial and Militar HEI)	Private-law public foundation	*Association *Cooperative *IPSS (Private social solidarity institution) Joint Stock Company *Local government (with no corporate status) *Non-governmental organisation (ONG) *Private foundations *Private limited company *Sole proprietorship by shares	Religious corporate body
Legal body	HEI has its own legal personality	HEI has its own legal personality	The founding bodies of private HEI are the legal persons. TheHEI do not have their own legal personality	HEI has its own legal personality
Status of Public Utility	Yes (Status is automatically acquired)		No Portuguese associations or cooperatives (private non-profit legal persons) may request public utility status, but any has such distinction from the Administration.	Yes (status automatically acquired by Article 2 of Decree-Law 128/90 of 17 April)
Patrimony	The set of assets and rights that have been transferred to it by the State or other entities, public or private, for the the accomplishment of its purposes (art. 109 of RJIES)	* Assets of the IES. In the case of an organic unit, by the assets of the institution that were specifically allocated to its attributions (Article 130, No. 1 of RJIES); * Assets ceded by the state or other entities after the formation of the foundation (Article 130, Nos. 2 and 3 RJIES).	The HEIs do not have their own assets. All assets and rights belong to the founding body, which has to create and ensure the conditions for the normal operation of the IES and allocate adequate facilities and equipment, as well as the necessary human and financial resources.	The Catholic University's patrimony is constituted by all assets and rights that belong directly to it (assets transferred by the Portuguese Catholic Institute, assets donated or left to the Church, or to any of its organisations or authorities with the express mention that they should be applied to the purposes of the Catholic University).

Initiative of creation	By initiative of the state (Art. 54 of RJIES)	The conversion of a public collective person into a public foundation under public law is done by the initiative of the HEI through a reasoned proposal to the government by the rector (or president), approved by the general council by the absolute majority of its members (Article 129, No. 1 of RJIES). Institutional change may also have the goal of creating a new institution as a result of the recomposition of organic units from various public higher education institutions and public or private research and development institutions. Institutional change may also have as its object the creation of a new institution resulting from the recomposition of organic units of various public higher education institutions and public or private research and development institutions.	By entities that have the legal form of: * a foundation, association or cooperative constituted specifically for this purpose, as well as by non-profit cultural and social entities which include higher education among their purposes; * private limited company or a public limited company set up specifically for this purpose (art. 32 RJIES)	By initiative of the Holy See/ Catholic University
Relationship between State and the IES	HEIs under state tutelage and supervision	Based on the contractualisation of multi-annual objectives. State supervision	State supervision	State supervision
Main governing bodies	* General Council * Rector, President or Director * Management Board * Scientific or technical-scientific council * Pedagogical Council	The Board of Trustees, which consists of five external trustees appointed by the institution, The government, upon the institution's proposal, will serve for a period of 5 years. * Management Board (appointed by the Board of Trustees, upon proposal by the rector, director, or president) * Other bodies of public higher education institutions (Article 133, No. 1 of RJIES).	* The founding body's governing bodies * Rector, President, or Director * Management Board * Scientific or technical-scientific council * Pedagogical Council * General Council	The two higher hierarchical organs of the UCP are the Congregation for Catholic Education and the Portuguese Episcopal Conference. UCP's individual governing bodies are the Grand Chancellor and the Rector, with one or more Vice-Rectors. Collegiate governing bodies of UCP. Rector's Council and the Council of Financial Management. Basic Unit Management Body: Director, the Governing Board, and the Scientific Council
Management paradigms	Public Management	Private management	Private management	Private management
For profit		Not for profit	Depending on the legal form of the founding body, they may or may not be for profit	Not for profit

IES autonomy	* Pedagogical, scientific and cultural autonomy * Patrimonial, administrative and financial autonomy		* Pedagogical, scientific and cultural autonomy * No patrimonial, administrative and financial autonomy (competences of the founding body).	Statutory, scientific, pedagogical, patrimonial, administrative, financial and disciplinary autonomy
Tax Exemptions	Exempt, under the same terms as the state, from taxes, charges, costs, emoluments, and stamps		No tax exempt regime	Exemption from: * State and local authority taxes, contributions, or fees, including stamp duty; * Preparation, costs, and justice tax in cases that take place in any court where it is a main party, assistant, or intervening party.
Financing	Allocations from the General State Budget and through own resources (art. 115 of RJIES)	Allocation from the State through multi-annual contracts (not less than less than 3 years - art. 136 no. 1 of RJIES) and throught own resources.	Own resources.	Own resources. The Government may grant subsidies to the Catholic University (article 11 Decree-Law 128/90 of 17/04)
Employment Relationships/ Contractual Regime of Academic Staff	Public employment (civil service regime) - Main Legislation: General Law of Public Service Employment - LTFP	* Public employment (civil service regime) - Main Legislation: General Law of Public Service Employment - LTFP and/or * Individual employment contract (safeguarding the civil service regime for lecturers who already enjoyed this regime before the transformation into a foundation - article 134 no. 4 of RJIES) - Main Legislation: General Law of Public Service Employment and Labour Code - Law n.º 7/2009 of 12/02.	* Individual employment contract - Main Legislation: General Law of Public Service Employment and Labour Code (Law No. 7/2009 of 2 February) and subsidiarity/complementarily * Service Provision Contract - Main Legislation: Decree-Law No. 47344 of November 25, 1996	Individual employment contract - Main Legislation: General Law of Public Service Employment and Labour Code - Law n.º 7/2009 of 12/02 and subsidiarity/complementarily * Service Provision Contract - Main Legislation: Decree-Law No. 47344 of November 25, 1996
Regulation of the Academic Career	* Status of the Scientific Research Career - Decree - Law No. 124/99 of 20 April * Statute of the University Teaching Career, Decree-Law No. 448/79 of 13		No specific regulation of Academic Carrer (shall be paralell to the he counterparts in public HEI	Has its own status of academic career. This statute follows the principles and norms of the public sector and the norms enshrined in the Code of Canon Law,

	November * Statute of the Polytechnic Teacher Career - Decree-Law No. 207/2009 of 31 August	and must hold the same qualifications) - Law unpublished	the specific documents emanating from the Congregation for Catholic Education, and the statutes of the Portuguese Catholic University (UCP).
Academic profissional categories and required qualifications	Definied by Regulation of Academic Carreer	Law unpublihed	Definied by Regulation of Academic Carreer

Note: All the indicated legislation must be considered in its current wording. For simplification, changes to the referenced legal instruments are not listed.
Source: Authors' own elaboration.

Public institutions are subject to direct state control and public accountability mechanisms, and operate under public law. In contrast, private HEI benefit from greater organisational autonomy in terms of governance, financial management and strategic decision-making, operating under private law provisions. These differences have direct implications for ownership. In public institutions, assets and control are internalised within the organisation itself, which has legal personality. In the Portuguese private HE sector, by contrast, HEI generally do not possess autonomous legal personality. They are legally embedded within the founding entities. These entities hold the assets and exercise strategic control. Consequently, ownership is located at the level of the founding entity rather than the academic institution.

Additionally, differences in funding structures reinforce these configurations. Public institutions rely primarily on state funding, whereas private institutions rely on tuition fees and other forms of private financing.

Ownership structures were operationalised through three indicators: (i) the legal form of the founding entity; (ii) the existence of control relationships involving multiple HEIs under the same founding body; and (iii) the concentration of organisational control as reflected in the allocation of decision-making authority and ownership rights established in the relevant legal framework.

Legal status should therefore be understood not merely as a classification variable, but as a structural feature that determines the distribution of control rights, influences governance arrangements and conditioning institutional behaviour.

Diversity of Legal Forms and Implications for Ownership

The analysis of private HEI in Portugal shows that the legal form of the founding entity is the main factor explaining differences in ownership models. Each legal form corresponds to a specific configuration of property rights, control mechanisms and constraints on the distribution of results, which directly influence governance structures and organisational strategies.

Table 2 — *Evolution of the number of Organic Units of Higher Education and Founding Entities in Portugal (2004–2021)*

	2004			2021		
	Nr Foundind entities	**Nr Organic Units**	**Nr Students**	**Nr Foundind entities**	**Nr Organic Units**	**Nr Students**
Association	11	11	3889		2	682
Cooperative	18	45	43122	12	29	36465
IPSS (Private social solidarity institution)	3	3	1560	3	3	1024
Local government (with no corporate status) Total	1	1	1391	1	1	972
Non-governmental organisation (ONG) Total	1	2	811	1	3	1866
Private foundations Total	10	16	16224	7	7	10200
Religious corporate body Total	6	35	12351	4	25	13506
Joint Stock Company Total	14	20	11648	7	14	5301
Private limited company portugal Total	10	14	6645	12	12	10450
Sole proprietorship by shares Total	3	3	1040	3	4	1556
Total	77	150	98 681	50	100	82 022

Source: Authors' own elaboration

Table 2 presents the longitudinal evolution of founding entities, organic units and student numbers between 2004 and 2021, making it possible to identify both sectoral contraction and internal reconfiguration. The data show that the sector contracted significantly between 2004 and 2021. The total number of founding entities declined from 77 to 50, while the number of organic units decreased from 150 to 100. Student enrolment also declined, from 98,681 to 82,022. However, this contraction was not uniform across legal forms. Some ownership configurations lost institutional presence, while others maintained or increased their relative weight. This indicates that legal form and ownership structure are associated with different capacities for adaptation, consolidation and survival.

Cooperatives are the most prominent organisational form in the Portuguese context. Although based on principles of collective ownership and democratic governance, empirical evidence shows that they maintained a dominant position in terms of student enrolment and capital structure throughout the analysed period, despite a reduction in institutional units. The discrepancy between the number of institutions and the volume of students reflects processes of internal consolidation and demand concentration. From an ownership perspective, this suggests that cooperative structures, although formally based on diffuse ownership, can generate effective control mechanisms that support scale and organisational resilience.

Foundations and associations represent typical forms of non-profit organisation, and they are characterised by the allocation of resources to purposes of general interest and by the absence of owners in the traditional sense. However, empirical evidence suggests a decline in their relative importance in PHE, particularly for associations, which are becoming marginalised in terms of both the number of HEI and student enrolment. This suggests that ownership structures with more diffuse governance and lower coordination capacity are at a structural disadvantage in an increasingly regulated and competitive environment.

Commercial companies introduce ownership models based on private capital and the prospect of distributing profits, where control rights are directly linked to shareholding. Data reveals an internal reconfiguration of this segment, characterised by a decline in the importance of joint stock companies and a substantial rise in the significance of private limited companies. This suggests a preference for more flexible organisational forms that combine concentrated control with the capacity to adapt to changing regulatory and market environments.

Religious entities constitute a distinct category, combining a strong, mission-oriented focus with relatively centralised governance structures. Despite a reduction in the number of HEI, the evidence shows that their share of student enrolment is increasing significantly, indicating processes of consolidation and demand concentration. This suggests that these entities benefit from specific advantages, such as reputational capital, organisational stability and network-based coordination.

The Founding Entity as the Core of Organisational Control

One of the most significant findings of the empirical analysis is the central role of the founding entity within the Portuguese system. Unlike in many other contexts, private HEI in Portugal generally do not have legal personality in itself but are legally embedded within the entities that establish them. These entities own the assets, hold administrative and financial authority, and exercise strategic control. This configuration suggests that ownership should be analysed at the level of the founding entity rather than the academic institution. In Portuguese private HE, ownership is therefore structurally external to the institution and is

exercised by entities with different legal forms, governance structures and strategic objectives.

The absence of autonomous legal personality means that the effective centre of organisational control is based outside the academic institution. This model contrasts with that of public institutions, where control and assets remain within the organisation. In the private sector, by contrast, the founding entity owns the assets and determines the key strategic decisions. This configuration means that ownership is structurally external to the HEI. The HEI is the academic and pedagogical unit, but the founding entity is the legal and organisational actor. If the unit of analysis is restricted to the HEI, the effective locus of ownership and control remains partially invisible. Shifting the analysis to the founding entity makes it possible to identify who controls resources, who holds decision-making authority and how institutional trajectories are shaped. Consequently, the founding entity emerges as the primary organisational actor, shaping institutional trajectories and influencing the capacity for adaptation, coordination and growth. This finding supports the article's argument that ownership operates as a hidden strategic determinant of institutional behaviour.

Institutional Groups and Ownership Concentration

The analysis of relationships between HEI and their founding entities reveals significant patterns of ownership concentration. Shifting the unit of analysis from the institution to the founding entity makes it possible to identify structures in which a single organisation controls multiple HEI, forming institutional groups. These groups are a central feature of the sector, enabling resource sharing, diversification of academic provision and optimisation of organisational scale. So, institutional groups matter because they transform ownership into an organisational coordination mechanism. Ownership concentration is therefore not merely a legal feature.

The capacity to form or sustain such groups is not homogeneous across legal forms and capital owners. Cooperatives, religious entities and some commercial companies appear more capable of supporting multi-unit structures, while associations and some foundations tend to be more atomised or vulnerable to decline. This differentiation reinforces the argument that ownership structures directly affect organisational capacity.

The analysis at the level of the founding entity shows that these structures are associated with consolidation processes, whereby a reduction in the number of institutional units occurs alongside stability or growth in student numbers.

From a theoretical perspective, these patterns can be interpreted in light of literature on corporate governance and industrial organisation. This literature highlights the importance of scale, coordination and diversification for organisational performance. In the context of HE, institutional groups are an organisational response to regulatory, demographic and competitive pressures.

The capacity to form such groups is not homogeneous across legal forms in Portugal. Cooperatives, religious entities and certain commercial companies are more likely to develop multi-institutional structures, whereas associations and some foundations tend to be more atomised.

This differentiation reinforces the idea that ownership structures directly affect organisational capacity.

Temporal Dynamics and Sector Reconfiguration

The longitudinal analysis reveals a process of contraction accompanied by structural reconfiguration. As evidenced in Table 2, the number of founding entities and organic units of HEI declined significantly between 2004 and 2021. This contraction is not accompanied by a proportional decrease in the number of students, which stabilises and recovers in the later years. This divergence can be explained by a process of organisational concentration, whereby fewer institutions absorb a significant share of demand, increasing the average size of HEI. These dynamics reflect the combined impact of demographic factors, increased regulation, and intensified competition. The introduction of accreditation and evaluation mechanisms has reinforced selective pressures, favouring organisations with greater capacity to meet regulatory requirements and operate at scale.

From an analytical perspective, this evolution can be interpreted as a process of organisational selection, in which ownership plays a decisive role. Structures characterised by concentrated control, access to resources, and coordination capacity are more likely to survive and expand, whereas more fragmented forms tend to disappear.

The analysis of the distribution of private HEI by type of founding entity, when interpreted based on the number HEI and students, reveals a more concentrated and structurally differentiated sector. Table 2 shows that the distribution of students differs significantly from that based on the number of HEI, highlighting the importance of ownership in the analysis of the PHE sector.

The private HE sectors remains predominantly anchored in non-profit organisations, which enrol most students. This challenges the direct correlation between private provision and market logic, emphasising the persistence of models rooted in social, cooperative and religious missions.

Cooperatives stand out as the dominant model, revealing a high capacity for scale and organisational resilience. Religious entities also exhibit strong consolidation, increasing their share of student enrolment. In contrast, associations and foundations lose relevance, reflecting structural limitations in their capacity to adapt.

Within the for-profit segment, an internal reconfiguration is evident, characterised by the growth of private limited companies, which are becoming the dominant form. This suggests that structures combining concentrated control with organisational flexibility have a competitive advantage.

The analysis at the level of the founding entity further captures internal dynamics that are not visible when HEI are analysed in isolation. As the driving force behind the HEI is held by the original body responsible for its establishment – the founding body – this becomes the most suitable unit for comprehending the way in which an HEI functions, particularly when it is part of a larger group of HEI.

The data reveal different expansion, consolidation and exit trajectories. Cooperatives and religious entities tend to reduce the number of institutional units while maintaining or increasing the number of students, which indicates consolidation. In contrast, associations and some foundations exhibit trajectories of decline or disappearance.

Within the for-profit sector, certain entities, particularly private limited companies, show significant growth, even when operating with a limited number of institutional units. These patterns confirm that organisational outcomes are strongly associated with ownership configurations.

Three main trajectories can be identified: exit, consolidation and expansion. These trajectories are not random, but are instead associated with particular ownership structures, which supports the idea that ownership is a key factor in determining institutional behaviour.

Exit is visible in legal forms that lost both institutional presence and student share.

Consolidation is observed in ownership configurations that reduced the number of units while maintaining or increasing student enrolment. Expansion or relative strengthening is particularly visible among private limited companies, which increased their student numbers despite operating with a limited number of organic units.

The results therefore show that Portuguese PHE remains predominantly anchored in non-profit or mission-oriented forms, particularly cooperatives and religious entities, while also displaying a growing role for more flexible for-profit structures. This finding challenges a simple association between private provision and market logic.

In fact, the restructuring processes in the Portuguese PHE sector reveal coordinated actions between HEI in the same group in terms of competition and cooperation (coopetition).

The results demonstrate that ownership is a key factor in the differentiation of institutions in the Portuguese private HE sector. Legal status defines possible organisational forms, which in turn structure ownership models. Ownership then determines the distribution of control, which conditions organisational capacity and shapes institutional strategic trajectories.

This analytical chain enables us to understand the sector beyond the public/private dichotomy, emphasising the role of ownership, which is grounded in the national legal framework, in shaping patterns of survival, growth and concentration.

Taken together, the results demonstrate that legal status, ownership and organisational behaviour are closely interconnected. Legal status defines the organisational forms available to founding entities; these forms generate distinct ownership configurations; and ownership determines the distribution of control rights, coordination capacity and strategic possibilities. This analytical chain makes it possible to understand the sector beyond the public-private dichotomy and to explain patterns of survival, growth, concentration and sectoral reconfiguration.

5. Conclusions

This article set out to examine how legal status structures ownership models and contributes to institutional differentiation in HE, using the Portuguese system as an empirical case. Moving beyond the conventional public–private dichotomy, the study proposed an analytical framework that places the legal-institutional configuration of organisations at the centre of analysis.

The findings demonstrate that the Portuguese private HE sector is characterised by significant organisational heterogeneity, resulting from the coexistence of multiple legal forms of founding entities, with legal forms observed in several European and Latin American HE systems (e.g. Chau et al., 2022; Franceško et al., 2020; Holmén & Ringarp, 2023) . This diversity is not incidental but is instead a direct outcome of the legal framework governing the sector. In this sense, legal status emerges as a fundamental structural determinant shaping institutional configurations.

Furthermore, the study shows that ownership in HE cannot be reduced to formal property relations. Rather, it should be conceptualised as a system of legally and institutionally structured control rights. Different legal forms, such as cooperatives, foundations, associations, commercial companies, and religious entities, give rise to distinct ownership regimes, which in turn shape governance structures, strategic behaviour, and organisational capacity.

A central contribution of this study lies in highlighting the pivotal role of the founding entity within the Portuguese HE system. The absence of autonomous legal personality among private HEI implies that effective control is exercised externally, by the entities that own assets and hold decision-making authority. These finding challenges conventional approaches that treat HEI as the primary unit of analysis and instead supports a shift towards analysing also ownership at the level of founding entities.

The longitudinal dimension of the analysis further reveals processes of sectoral reconfiguration, characterised by consolidation, concentration of control, and organisational selection. These dynamics indicate that ownership structures are not static but evolve in response to regulatory, demographic, and competitive pressures. Organisational forms associated with concentrated control and coordination capacity appear more resilient and better positioned to expand.

From a theoretical perspective, the article contributes to the literature by reconceptualising ownership as a hidden but decisive determinant of institutional differentiation, structured by legal status. By integrating insights from the theory of the firm with HE research, the study offers a more nuanced understanding of how institutional diversity is produced and sustained.

The article also contributes to the literature by distinguishing between legal status, ownership and governance. Legal status defines the institutional conditions under which HEI operate; ownership determines the allocation of ultimate control rights; and governance concerns the mechanisms through which authority is exercised. Examining these dimensions together provides a more comprehensive explanation of institutional differentiation than approaches based exclusively on funding sources, mission or public-private classification.

Regulatory frameworks frequently treat private HE as a relatively homogeneous category. The results suggest that institutions operating under different ownership arrangements may possess market capacities, governance structures and strategic incentives. Greater attention to ownership diversity may therefore contribute to more differentiated approaches to regulation, evaluation and accountability.

Although grounded in the Portuguese case, the findings have broader implications for the analysis of HE systems. Similar ownership arrangements can also be observed in several European and Latin American higher education systems, particularly where private institutions are legally embedded within foundations, religious organisations, associations, or corporate entities. Findings suggest that legal frameworks should be understood not merely as contextual factors, but as constitutive elements that shape organisational forms, ownership structures, and patterns of institutional behaviour. This perspective opens new avenues for comparative research, particularly in examining how different legal regimes influence HE systems across national contexts. Neverthless, in private HE systems where HEI lack autonomous legal personality, ownership must be analysed at the level of the founding entity, because this is where legal control, assets, and strategic authority are located.

The findings also carry implications for institutional leaders and policymakers. Understanding ownership structures may improve the design of regulatory frameworks, enhance governance arrangements, and support more differentiated approaches to quality assurance and strategic planning within increasingly diverse higher education systems.

Several limitations should nevertheless be acknowledged. The analysis relies primarily on documentary sources and therefore captures formal legal and organisational arrangements more effectively than informal dynamics of influence and decision-making. In addition, the study focuses on a single national context, which limits the direct generalisability of the findings. Future research could extend this framework through comparative analyses of different HE systems, explore the relationship between ownership structures and institutional performance, and investigate how ownership arrangements influence governance practices, strategic decision-making and organisational resilience.

Neverthless, this study contributes to the literature in four ways. First, it demonstrates the analytical limitations of the public-private dichotomy in explaining institutional diversity. Second, it reconceptualises ownership as a system of legally structured control rights. Third, it introduces the founding entity as a relevant unit of analysis in private higher education systems lacking autonomous institutional legal personality. Finally, it proposes an integrated analytical framework linking legal status, ownership and organisational behaviour.

Future research could build on this work by conducting cross-country comparisons and incorporating qualitative approaches, such as interviews with institutional actors, in order to capture informal dimensions of governance and control. Such developments would further enhance understanding of the complex relationship between legal structures, ownership, and institutional dynamics.

In conclusion, this study demonstrates that ownership, as structured by legal status, plays a central role in shaping institutional differentiation and strategic behaviour in HE. By moving beyond the traditional public-private dichotomy and placing the legal framework at the core of analysis, it provides a more comprehensive and theoretically grounded account of contemporary HE systems.

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Conceptualization, MEFF, MLMT; methodology, MEFF, MLMT; software, MEFF; validation, MEFF, MLMT; formal analysis, MEFF; investigation, MEFF; resources, MEFF; data curation, MEFF; writing—original draft, MEFF; writing—review and editing, MEFF, MLMT; visualization, MEFF; supervision, MLMT.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

An in-depth description of the M&A with chronological and interinstitutional mapping of M&A activities that took place in the PHE sector between 2004/05 to 2021/22 can be provided under request to the corresponding author. Such description focuses on the following characteristics of each M&A: HEI involved, founding body and institutional changes per legal act.

ETHICS STATEMENT

This study is based exclusively on the analysis of legal acts and publicly available institutional data and does not involve human participants or personal data. Therefore, ethical approval and informed consent were not required. The research was conducted in accordance with relevant institutional and national guidelines for research integrity.

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LLMS DISCLOSURE

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Restructuring Private Higher Education in Portugal: A Longitudinal Study of Mergers and Acquisitions

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Abstract

In recent decades, private higher education (HE) in Portugal has undergone significant structural transformation, driven by regulatory reforms, demographic pressures, and increasing market competition. Among the strategies adopted by private higher education institutions (HEI), mergers and acquisitions (M&A) have emerged as a key mechanism for adaptation and consolidation, yet remain underexplored, particularly in private systems and longitudinal analyses. This study presents a longitudinal analysis of M&A processes between 2004/05 and 2021/22, based on a purpose-built database of legal acts and institutional restructuring events. Using qualitative content analysis, these processes are classified according to typologies from governance and HE literature, identifying patterns, key drivers and forms of institutional adaptation The findings show that M&A activity occurs in waves linked to major regulatory milestones, suggesting a close relationship between regulatory change and institutional restructuring dynamics. The most common forms include mergers and absorptions, acquisitions and ownership transfers, and institutional reconfigurations. These processes are primarily strategic responses to regulatory constraints and market pressures, enabling HEIs to optimize resources, maintain accreditation, and strengthen financial sustainability. This study contributes to the understanding of HE governance and institutional adaptation, offering a comprehensive system-level analysis of M&A in the private sector, with relevant implications for policymakers and institutional leaders.

Keywords: Governance and Regulation, Institutional Restructuring, Mergers and Acquisitions, Organisational change, Ownership and founding entities, Portugal, Private Higher Education

1. Introduction

In recent decades, higher education (HE) systems across Europe have undergone significant transformation, driven by demographic decline, increased competition, and expanding regulatory frameworks. In Portugal, these dynamics have been particularly pronounced in the private higher education (PHE) sector, where institutions operate under market-based funding models while simultaneously complying with increasingly stringent regulatory requirements (Ferreira-Fernandes, de la Torre García, et al., 2025).

The Reform of the Basic Law of the Educational System (LBSE - Law No. 46/86, of October 14) in 2005, in alignment with the Bologna Process, introduced a new framework for HE studies, with three cycles of study, culminating in the "bachelor" (1st cycle), "master" (2nd cycle), and "doctor" (3rd cycle) degrees, which was fully implemented in the academic year 2009/2010. This reform had a profound effect on HE, as most Higher Education Institutions (HEIs) had to introduce curricular and organisational reforms to accommodate the new European standards. This reform, along with the creation of the Higher Education Evaluation and Accreditation Agency (A3ES) in 2007 and the establishment of the Legal Framework for the Quality Assessment of Higher Education (RJAQES - Law No. 38/2007, of August 16) introduced

additional requirements and raised quality standards for accreditation of HEIs and degrees, thereby putting pressure on HEIs to improve overall quality (Gregory & Machado-Taylor, 2015).

These reforms and regulations had a greater impact on Private Higher Education Institutions (PHEIs), which, due to the nature of their courses, that some authors classify as "pen-and-paper", invested less in research and teaching careers, and had to adapt to become competitive and survive (e.g. Sin et al., 2017b). At the same time, the economic crisis of 2008 exacerbated the sector's problems, as many students opted for public HE due to its lower cost and perceived higher quality, although this trend has gradually diminished (Teixeira, 2015).

PHEIs play a critical role in expanding access, diversifying provision, and increasing system responsiveness within HE systems worldwide (e.g., Levy, 2011; Teixeira et al., 2016). In Portugal, the PHE sector has historically complemented public provision, particularly during periods of rapid expansion in student demand (Ferreira-Fernandes, García, et al., 2025).

In contrast to public HEIs, which benefit from direct state funding and stable institutional frameworks, private HEIs rely predominantly on tuition fees and market-based revenues. Thus, are structurally more fragile and more vulnerable to economic recessions, resulting in lower enrolments as the supply from the public sector (tendentially free) increases and students seek cheaper options (Azziz et al., 2017). Furthermore, competition in the HE sector and the accreditation requirements for establishments and courses have increased, and the regulatory environment has been volatile, with reforms impacting funding, accreditation, scholarships, and student fees, affecting enrolments in both public and private education (Biscaia et al., 2021). This context has forced private HEIs to invest in communication strategies, differentiated programmes, human resources, and other structural elements to recruit new students (Cardoso et al., 2011) but they have also restructured themselves to remain viable, resilient and relevant to ensure institutional sustainability, operational resilience, and sectoral competitiveness. Mergers and Acquisitions (M&A) have become a strategy for resource optimisation and increasing competitiveness (Rocha et al., 2019).

M&A in the corporate sector is widely studied and considered a viable strategy for business growth and restructuring (Austin-Campbell & Johnson, 2021). In the HE sector, the European University Association (EUA) launched in 2015 its University Merger Tool (University Mergers in Europe, 2019), which maps mergers and institutional groupings in European HE since 2000 onwards. Also, extant literature in HE has explored the specificities of M&A (e.g. (Estermann & Pruvot, 2015)), however it has not yet produced a longitudinal analysis for the private HE sector, and has not addressed how HE contexts translate into institutional restructuring changes at a micro level, i.e. previous studies usually focus on a few case studies but do not carry out a comprehensive analysis of all the restructuring that has taken place in HE systems.

Many studies were produced in the scope of USTREAM project (e.g. (Kupriyanova et al., 2018)) that analysed the consolidation or restructuring processes in 22 national European HE systems, including Portugal, but focusing solely on the public sector study cases and disregarding the private sector, and analysing rather superficially such restructuring while we do so in depth.

Also, the DEFINE project, explored strategies for efficient funding of universities in Europe, particularly looking at university mergers, excellence initiatives (which are known to instigate institutional transformations such as mergers, e.g. Casani et al., 2014, and also performance-

based funding mechanisms, producing various reports on this topic (e.g. (Rocha et al., 2019). However, none of these reports explore the specificities of the private HE sector. The same applies to other studies (e.g. (Austin-Campbell & Johnson, 2021; Bor & Shargel, 2020; da Silva et al., 2024; Estermann & Pruvot, 2015; Ripoll Soler & De Miguel Molina, 2013) that address the context of HE, which are based on a limited number of case studies or comprehensive approaches that do not translate the changes to a micro level.

Studies in other countries (Frølich & Stensaker, 2021; G. Harman & Harman, 2003; Kupriyanova et al., 2018; Mizutani et al., 2023; Policarpo Garcia & Furquim de Azevedo, 2019) allow for the identification of the rationale and aims behind M&A processes, trends, drivers, enablers, limitations, factors impacting on efficiency.

The majority of HEIs in Europe are small or medium-sized, with only 10% of them having more than 20,000 enrolments (Bennetot Pruvot et al., 2015) and mergers have generated larger HEIs, with greater visibility and competitiveness. Mergers in European public HE are driven by the belief that bigger is better in the pursuit of greater competitiveness and efficiency (da Silva et al., 2024). In fact, various studies (e.g (Austin-Campbell & Johnson, 2021; Boling et al., 2017; He et al., 2020; Wollscheid & Røsdal, 2021), show that M&A in the public and private sectors can occur for different reasons, from the need to avoid closure to the pursuit of strategic gains in scale and efficiency and mergers between similar HEIs often result in better academic integration than mergers with distinct profiles.

The primary objective of this study is to produce a classification of the main trends in the restructuring processes in PHE, both from a systemic and legal perspective. In so doing, we analyse in depth the M&As that have taken place among PHEIs in Portugal in the last two decades. The Portuguese PHE system is particularly interesting as it is one of the oldest HE systems in Europe, but with a very young private HE sector that has undergone significant transformations over the past decades (Ferreira-Fernandes, García, et al., 2025). This provides sufficient variability to identify affected HEIs, and which economic sectors (for-profit or non-profit) are most impacted, while answering the following research questions: what forms of M&A strategies were adopted by the PHE sector in response to regulatory and market constraints? To address these questions, we built a dataset that tracks legal acts and PHEIs in Portugal along its acquisitions, mergers, splits, transformations, etc., by educational groups from academic year 2004/05 to 2021/22.

Studies like the DEFINE project classify mergers and other restructurings as a more isolated phenomenon in some countries, such as Portugal, in the sense that there is no political agenda on the subject. However, M&A can be a more silent phenomenon in the private sector, as PHEIs depend solely on themselves to survive and are less reliant on political or governmental agendas. This study aims to investigate whether restructuring patterns in Portuguese PHE reflect isolated institutional decisions or broader responses to a common regulatory and competitive environment. This study adds to existing literature in several ways. First, we present a longitudinal analysis of the legal acts related to M&A in PHE and studying PHEIs at a micro level, since information on the private sector is very scarce and difficult to access. To the best of our knowledge, the literature on M&A in European PHEIs is rare, and non-existent from the ownership and regulatory perspective.

Drawing on a purpose-built database of legal and institutional changes between 2004/05 and 2021/22, the study identifies patterns, typologies, and drivers of M&A activity. Beyond documenting restructuring events, the analysis examines how regulatory developments, accreditation requirements and competitive pressures have influenced institutional responses over time. In doing so, it contributes to the literature on HE governance by linking

regulatory change with organisational restructuring and by conceptualising M&A as a form of constrained adaptation.

In this study, constrained adaptation is understood as the process through which private HEIs adjust their organisational structures in response to external pressures while operating within a restricted set of strategic alternatives imposed by regulatory requirements, demographic decline, and market competition. Empirically, constrained adaptation is observed through restructuring events such as mergers, absorptions, ownership transfers, and institutional reconfigurations occurring in periods of intensified regulatory change.

This paper is organized as follows: Section 2 provide an overview of Portuguese HE system from a legal perspective, with focus on private HE. Section 3 presents our theoretical background for M&A in HE sector. Section 4 introduces the data and methodological approach. Section 5 presents the results and discussion of empirical analysis. Section 6 concludes with implications and recommendations for policy making.

2. Contextualization of Private Higher Education in Portugal

In Europe, HE systems vary greatly, both in their organisation and legal requirements, and according to the historical reality of the country. The distinction between binary and unitary systems is one of the key issues in structuring HE, with impacts on the organisation of educational establishments, their mission and the design of the educational, scientific and cultural project (e.g. (Castilho & Machado-Taylor, 2024, 2023).

In binary HE systems (e.g. Finland and the Netherlands or Portugal), there is a formal distinction between universities and polytechnic institutions (of applied sciences). The main distinguishing feature is that in these systems, bachelor's (1st cycle) and master's (2nd cycle) courses are taught in both types of HEIs, while doctoral (3rd cycle) courses are generally offered only in universities, since their mission is more focused on research (e.g. (Winckler et al., 2018).

In a unitary model, adopted by countries such as Spain and Italy, HEIs have the same formal status, with study programmes conferring all the degrees (e.g. Lepori, 2022).

Portugal has an officially binary system, but it has evolved towards greater convergence between universities and polytechnics (Castilho Machado-Taylor, 2023; Machado et al, 2008). This trend has driven recent legislative changes, such as Law 16/2023, which allowed polytechnic institutions to award doctoral degrees.

In Portugal, the current legal framework of HE defines university education as focused on solid scientific training, integrating the efforts and competences of teaching and research, and polytechnic education as mainly focused on advanced professional and technical training, with a practical orientation (Article 11 of LBSE; Article 3 of Legal Framework of Higher Education Institutions - RJIES - Law no. 62/2007 of 10 September).

University education in Portugal is made up of universities, university institutes and non-integrated university schools. Universities are organised into organic units, which may be called Faculties, Institutes, Higher Schools, Departments or other names according to their statutes (Article 5 of RJIES).

Polytechnic education is made up of polytechnic institutes and non-integrated polytechnic schools (of a specialised nature). Polytechnic institutes are structured in organic units called polytechnic schools or other designations defined in their statutes (Article 5 of RJIES).

In addition to these categories, there are also military and police HEIs, which follow specific models belonging to the public sector (Decree-Law No. 249/2015, of October 28; Decree-Law No. 13/2022, of January 12) and are therefore excluded from this study.

To better understand the institutional framework or organisational status, it is necessary to understand some terminology from the Portuguese legal lexicon, which is relevant to understanding the distinct form, when we refer later to legal and organizational changes within the scope of M&A.

The RJIES defines an “Establishment” as an autonomous institutional unit within HE, an “Integrated Establishment” as made up of more than one “Organic Unit”. “Non-integrated establishment” does not have “Organic Units”, and “Organic unit” constitutes an institutional, pedagogical and scientific base of the integrated institutions, with autonomy conferred by the institution's statutes.

As for the nature of the HEI, the RJIES distinguishes between two groups: public HE (owned by the state or other forms of public entity) and private HE (private entities).

In the case of the private sector, the law (RJIES) also imposes specific rules regarding the organisation and management of PHEIs. The founding body is responsible for establishing and managing the institution, especially in terms of economic and financial management. The autonomy of the HEIs themselves is limited to cultural, scientific and pedagogical autonomy. The definition of administrative and financial autonomy is set out in their own statutes (article 143 RJIES). However, given that it is the founding body that holds the legal personality, it is up to it to make the main decisions on organisation, management and strategic positioning (article 138 of RJIES).

It should also be borne in mind that PHEIs are subject to a public interest recognition procedure by the Ministry of HE to become part of the HE education system and thus operate and award academic degrees. Entities establishing PHE establishments must take one of the following legal forms: foundations (duly recognised by the Ministry); associations; cooperatives (set up specifically for this purpose); non-profit cultural and social entities; private limited companies or public limited companies (set up specifically for this purpose). Regardless of the form they take, all entities wishing to create and maintain a PHEI must fulfil the appropriate requirements of institutional suitability and financial sustainability (article 32 RJIES).

There are also specific requirements regarding the number and nature of the minimum number of study cycles, depending on the nature of the HE establishment, as well as the qualification criteria for teaching and research staff for the purpose of accrediting study cycles. These requirements have increased significantly with the changes introduced by Decree-Law no. 65/2018, of 16 August (changes to RJGDES).

The legal definition of "public institutions" and "private institutions" imposes a complex and diverse set of regulatory parameters. Historically, the evolutionary trajectory and role of public and private HEIs have been distinct (Ferreira-Fernandes, García, et al., 2025). However, since 2006, there has been a significant convergence and alignment of operational requirements in both sectors. This convergence was driven by the establishment of common requirements for the accreditation of HE study programmes at the bachelor's, master's, and doctoral levels (RJGDES, Decree-Law No. 74/2006), the creation of the A3ES, and the implementation of a common legal framework for quality assessment in public and PHE (Law No. 94/2019).

In Portugal HE is considered a public interest good (article 1 and 2 of LBSE). This makes a "buyer beware" policy (Tierney, 2012) unacceptable, justifying the highly regulated nature of the HE system. Institutions, regardless of their status, are required to meet a set of conditions and obtain prior accreditation from the governing bodies for their study cycles, ensuring that HEIs (especially private ones) provide high-quality services (Sin et al., 2017a).

Thus, the regulations imposed by the state not only affect the daily operations of HEIs but also shape their strategic responses

Issues related to funding pose a significant challenge for PHEIs. Unlike public HEIs, which receive substantial government funding, PHEIs rely primarily or almost entirely on their teaching activities, that is, on student tuition fees. This financial model is more challenging and precarious, especially during periods of economic crisis, when potential students may opt for more affordable alternatives in public HEIs (Cerdeira et. al., 2015).

Market competition is another critical challenge. The HE sector in Portugal is increasingly saturated, with several PHEIs competing for a limited number of students. This competition forces PHEIs to invest in offering differentiated and competitive programmes to attract new students while simultaneously meeting demanding accreditation requirements (Cardoso et al., 2011). This investment increases (fixed) operational costs without guaranteeing an adequate financial return.

Furthermore, the regulatory environment is complex and ambiguous, creating uncertainty for private HEIs (Ferreira-Fernandes, de la Torre García, et al., 2025). HE policy reforms can modify funding mechanisms, accreditation processes, and even scholarship and tuition policies (in the public sector), which may impact enrolment numbers in both sectors.

In summary, private HEIs in Portugal face a complex scenario of regulatory compliance, financial sustainability and market competition (e.g. ; (Teixeira et al., 2004; Teixeira & Dill, 2011).

To address these challenges, private HEIs have had to adapt and reorganise to ensure their quality and sustainability, with organisational restriction (including M&A) being a strategic option.

In Portugal, as in other European countries, there has been a broad reorganization of the sector. Nevertheless, the country's PHE sector demonstrates distinctive characteristics, such as a high proportion of for-profit providers, no public funding and no M&A political agenda. That influences the form and frequency of restructuring events.

3. Mergers and Acquisitions in Higher Education – Literature Review

The DEFINE project explored strategies for efficient funding of universities in Europe (Ripoll Soler & De Miguel Molina, 2013), particularly looking at university mergers, excellence initiatives (which are known to instigate institutional transformations such as mergers (e.g. Casani et al., 2014), and also performance-based funding mechanisms, producing various reports on this topic (Rocha et al., 2019). However, none of these reports explores the specificities of the PHE sector. The same applies to other studies, e.g. (Bor & Shargel, 2020; Mizutani et al., 2023), that address M&A in HE, based on a limited number of case studies or comprehensive approaches that do not translate the changes to a micro-level.

International studies (e.g. (Boling et al., 2017; He et al., 2020; Wollscheid & Røsdal, 2021)) show that M&A in the public or the private sector can occur for different reasons, from the need to avoid closure to the pursuit of strategic gains in scale and efficiency and mergers

between similar HEIs often result in better academic integration than mergers with distinct profiles.

M&A presents both differences and similarities in relation to the corporation. The definitions found in the literature reflect a wide variety of terms to describe processes of transformation and unification between institutions, such as acquisition, merger, consolidation, integration, incorporation, absorption, clustering, federation, alliances, and consortia in HE and highlight the different strategies employed to manage institutional change. However, these concepts are not rigid or strictly defined, nor are most of them interdependent or mutually exclusive.

A merger is defined as the process of transformations that occur when two or more institutions combine to form a single entity. In many cases, mergers involve the full integration of institutions, leading to the dissolution of the original entities into a newly formed organization (Azziz et al., 2017). Mergers can be classified based on different criteria, such as horizontal mergers, which occur between similar institutions, or vertical mergers, which take place between institutions offering different levels of education (e.g., (Frølich & Stensaker, 2021). A merger formally combines the assets, management, and ownership of the two entities (He et al., 2020).

Consolidation is defined as a specific form of merger in which two or more institutions unite as equals forming a new entity, usually with the goal of achieving economies of scale.

Integration is defined as a process of combining different organizational structures, cultures, and operations following a merger. This can involve academic, administrative, and cultural integration, where faculty and staff from different institutions must adapt to a new organizational identity and governance model (Wollscheid & Røsdal, 2021).

Absorption is defined as the process that occurs when one institution fully integrates another into its structure, effectively dissolving the acquired institution's independent identity. This is a form of merger where the dominant institution retains its name, governance, and operational control, while the absorbed institution ceases to exist as a separate legal entity (Azziz et al., 2017).

Clustering is defined as a process of grouping multiple institutions under a single umbrella while maintaining some degree of institutional autonomy. Unlike mergers, clusters do not always lead to full institutional dissolution but may involve strategic collaborations, shared governance structures, and joint academic programmes. Clustering is often used as a policy tool to improve system efficiency while preserving institutional diversity (Bennetot Pruvot et al., n.d.)

Institutional restructuring is defined as a process that involves operational, financial, or governance changes without necessarily implying mergers or acquisitions. It may include changes in funding, governance, academic structure, and administrative reorganization.

Alliances and consortia are forms of cooperation between institutions that share resources and activities without formal merger or integration. They are defined as alternative corporate strategies (e.g. Hagedoorn and Duysters, 2002), but his concept will not be addressed in this study because no legal acts are required.

Takeovers or acquisitions are defined as the process whereby one institution is subsumed into another, with the latter retaining its name and presence while the former mostly disappears as an independent entity (K. Harman & Meek, 2002).

Overall, the literature identifies multiple drivers of mergers and acquisitions in HE, including efficiency gains, financial sustainability, and strategic positioning. However, it tends to overlook the role of regulatory frameworks as structuring forces that shape not only the occurrence but also the form and timing of these processes. Moreover, existing studies rarely adopt a longitudinal perspective or focus on the private sector. As a result, there remains limited understanding of how regulatory environments influence institutional restructuring over time. This study seeks to address this gap by providing a system-level, longitudinal analysis of M&A in Portuguese PHE.

4. METHODOLOGY DATA SOURCES AND ANALYSIS CRITERIA

This study adopts a qualitative longitudinal research design, based on the systematic analysis of legal acts and institutional restructuring events in Portuguese PHE between 2004/05 and 2021/22. It provides an original contribution by developing a longitudinal dataset of legal acts related to mergers and acquisitions (M&A) in the Portuguese PHE sector.

Data collection followed a systematic document analysis strategy, drawing on legal acts selected according the inclusion criteria: direct relation to institutional restructuring (e.g., mergers, acquisitions, ownership changes, and closures). A coding protocol was developed to classify each act by type of restructuring event, date, and institutional actors involved, enabling both temporal mapping and comparative analysis.

Classification categories were derived from the literature on M&A and subsequently adapted to the specific legal and organisational characteristics of the Portuguese PHE system, allowing both temporal mapping and comparative analysis.

Each legal act was independently examined and coded according to the predefined classification framework presented in Section 4.1. In cases involving multiple simultaneous changes, such as ownership transfer followed by integration or merger, classification was based on the primary legal effect established in the act. Ambiguous cases were re-examined through cross-checking with DGEEC records to ensure consistency in classification and interpretation.

To enhance data reliability and validity, the dataset was cross-referenced with descriptive information from the ETER - European Tertiary Education Register (Lepori et al., 2016; Lepori et al., 2023).

4.1. CONCEPTUAL DEFINITIONS OF MERGERS AND ACQUISITIONS: THE PORTUGUESE CONTEXT

The Portuguese PHE education system is the empirical context of this study. This system is particularly interesting as it has undergone a significant number of transformations over the past decade. Moreover, the literature reveals the absence of micro-level studies in the Portuguese private sector, which is partly justified by dispersion and the difficulty of accessing information.

Given the diversity of approaches and motivations behind M&A processes, it is essential to adapt the definitions found in the literature and align them with the Portuguese HE system, particularly considering the specificities of the PHE sector.

The term “consolidation” is rarely used in the Portuguese context. The terms “Integração,” (integration) “Incorporação” (incorporation) and “Fusão” (merger) are used almost interchangeably in legislative acts to refer to the unification of institutions. In this study, we adopt terminology that aligns closely with the lexicon used in legislative frameworks governing these transformations. Thus, we use “Merger/Absorption” for cases in which one or more institutions combine to form a single entity. This definition also encompasses cases

involving the full integration of institutions, leading to the dissolution of the original entities into a newly formed organization. Consequently, the terms “incorporation” and “merger” are used interchangeably.

We refer “Integration” in the processes of combining different organizational structures. The key distinction from a merger is that the institutions involved do not completely lose their identities.

The term “acquisition” or “ownership transfer” is used only when there is a change in the ownership of the HEI. That is, when a HEI comes under a new founding entity (a different legal entity).

The term “clustering” is applied to cases where multiple institutions group under a single umbrella while maintaining some degree of institutional autonomy.

The term “consolidation” is used as a specific subtype of merger, particularly for cases where two institutions unite as equals to form a new entity.

“Institutional restructuring” refers to a type of transformation that does not fall under M&A concepts but is included in this study as a type of change that does not necessarily alter the legal identity of HEIs but affects their nature, legal framework, and operations. This restructuring often occurs alongside M&A processes. In some cases, adaptation and restructuring are requirements for regulatory approval of mergers or acquisitions.

For analytical purposes, “institutional restructuring” encompasses legal and organisational restructuring. Legal restructuring refers to changes affecting the legal status, recognition, or regulatory position of institutions (e.g. the transformation of a university institute into a university), while organisational restructuring refers to changes affecting campuses, academic units, or internal institutional structures. This study also considers two terminologies less frequent in the M&A literature on HE, but relevant to our analysis. These terms emphasize the division or separation of entities (companies or other legal structures) into more discrete units, such as spinoffs, split-offs, and carve-outs. These terms address specific cases of buying and selling parts or entire entities. In the context of M&A and institutional restructuring, such cases are observed at both the institutional level and within individual academic units.

Several of the studies cited have also attempted to classify or categorize mergers based on various criteria. In this study, we classify M&A based on the classifications of (G. Harman & Harman, 2003) as they are widely used in literature.

Mergers are classified based on their participants into single-sector vs. cross-sector (occurring within a single sector or across different sectors) and twin vs. multiple-institution mergers (involving only two institutions or more than two).

The classification based on the academic profiles of HEIs distinguishes between horizontal mergers, where institutions share similar academic profiles, and vertical mergers, where institutions have different academic profiles. Additionally, mergers are categorized as complementary vs. non-complementary (overlapping) based on factors such as educational offerings, the nature of education (university vs. polytechnic), institutional size, and the number/location of campuses.

The term "vertical mergers" is used in cases where institutions are incorporated at sequential levels of academic degrees, whereas horizontal mergers bring together similar institutions offering equivalent degree levels.

The concepts of "similarity" and "complementarity" (Azziz et al., 2017; Boling et al., 2017) are strategically significant in positioning institutions, as they may have very different implications at a strategic level. In this study, we adopt a simplified approach based on the academic profile of the institutions involved.

Mergers are also classified based on the strategy and motivation driving them and/or the expected outcomes of the absorption. In this study, we use a simplified approach, fundamentally based on the academic profile of the institutions involved, classifying mergers into four main drivers: forced mergers, driven by the obligation to comply with legal and regulatory accreditation requirements; efficiency-driven mergers, reflecting potential gains in efficiency and economies of scale; market-driven mergers, aimed at increasing institutional capacity (e.g., additional campuses and programmes) to enhance sector competitiveness and attract more students; survival mergers, motivated by financial difficulties or low institutional viability (HEIs with fewer than 500 students).

At the initiative level, the distinction between voluntary mergers (initiated by the institutions themselves) and forced mergers (initiated by the government), which is commonly observed in international studies (e.g. Harman and Harman, 2003) will receive little emphasis in this study. In the private HE sector, M&A and acquisitions always require the consent of at least three parties: the two HEIs involved and the government, which must approve their proposal. Only in the case of institutional restructuring can coercive measures be imposed by regulatory bodies.

The classification based on legal status and ownership is rarely addressed in European HE studies but is more common in countries where the private sector plays a significant role, such as the United States (e.g. (Bor & Shargel, 2020)). M&A processes often lead to changes in legal status, which may result in loss of legal independence of merged entities, integrating under a different jurisdiction, creation of entirely new legal entities; changes in ownership structure (Azziz et al., 2017; Policarpo Garcia & Furquim de Azevedo, 2019), changes in funding models and institutional autonomy, affecting the degree of state control do not apply to Portuguese HE due to legal constraints within the RJIES framework.

In this study, organizational structure changes are analyzed within the scope of institutional restructuring, focusing only on legal and operational aspects related to the restructuring of faculties and departments (Wollscheid & Røsdal, 2021).

Since Portuguese HE follows a binary system, this study will also analyse potential changes in the nature and scope of HEIs involved in M&A processes.

These classifications focus on a limited number of categories, reducing complexity and enhancing the objectivity of our analysis, which is structured in seven dimensions, summarized in Table 1.

Table 1 - *Analytical Dimensions for Classifying Institutional Transformation Processes in Higher Education*

Concept/Definition	**Merger/Absorption**
	Integration
	Clustering
	Acquisition
	Consolidation
	Institutional restructuring
	Split-offs vs split-offs vs Carve-outs
Participants	Single-sector merger

	Cross-sector merger
Academic similarity and complementarity	Horizontal merger
	Vertical merger
	Complementary mergers
	Non-complementary mergers
Strategy and motivation	Forced
	Efficiency-driven
	Market-driven merger
	Survival merger
Initiative	Voluntary mergers
	Forced mergers
Legal Status	Independent to dependent unit or Vice Versa
	Changes in HEI nature
Ownership	Founding body/ownership
	Profi to Non-profit Private or Vice Versa
	Public to Private or Vice Versa
Scope/nature	Politechnic education to University education or vice versa

Source: Authors' own elaboration

4.2. Data and methodology

Using a qualitative approach, this study provides an in-depth analysis of the main legislative acts at a micro level related to M&A in PHE in Portugal. This includes the examination of legal documents on M&A to map and classifying the changes implemented in PHEIs from a legal and regulatory perspective. This study is based on a unique set of legislation on PHE and the main legal acts of institutional restructuring, collected over the period from 2004 to 2022. This information, gathered through publications in the Official Gazette of the Portuguese Republic, was cross-referenced with data from the ETER (Lepori, 2023) and data provided by Directorate-General for Education and Science Statistics - DGEEC (accessed on 04/10/2024), also addressing the information gap concerning the contextual changes in statistical classifications. A total of 81 legal acts were linked to each HEI and classified according to the M&A typologies identified in the literature, which have been adapted to the Portuguese context. This approach allowed the identification of the restructuring patterns, their temporal distribution, and the institutional mechanisms through which PHEIs responded to regulatory and market challenges. This study provides information on entities which, due to their size and characteristics, are excluded from the international registers and databases, but which are part of PHE groups and are relevant for comparative analyses.

5. Results and discussion

The analysis reveals that restructuring processes in Portuguese PHE do not occur linearly but rather in distinct waves, closely associated with major regulatory and policy developments. Three main patterns emerge from the data: (1) periods of intensified institutional closure and consolidation, (2) peaks in merger and acquisition activity, and (3) continuous institutional restructuring driven by regulatory compliance requirements. These patterns suggest that restructuring is not the result of individual institutional decisions. The fact that restructuring events tend to occur alongside major legislative reforms suggests that regulatory change acts as both a framework for institutional activity and a trigger for

organisational transformation. In 2004, there were 114 PHEIs in Portugal with 150 organic units (e.g. integrated polythetic and university schools). By 2021, this number had decreased to 64 HEIs (-44%) and 100 organic units (-33%), accompanied by a corresponding reduction in the number of courses/study cycles. The scale of this reduction (see detail in Table 2) suggests that restructuring has been central to the evolution of the PHE sector rather than being a marginal phenomenon. The simultaneous decline in the number of HEIs, organic units and courses points towards a process of consolidation, with the aim of concentrating resources, reducing duplication and improving institutional viability.

Table 2 - *Evolution of Portuguese Private Higher Education Institutions, Organic Units, Study Cycles and Student Enrolment (2004–2021)*

Year (Y)	No. PHEIs	No. Organic Units	No. Degree coures	No. Enrolled students in degree courses	No. PHEI (Y_n - Y_{n-1})	No. Organic Units (Y_n - Y_{n-1})	No. Courses/Study Cycles (Y_n - Y_{n-1})	No. Students (Y_n - Y_{n-1})
2004	114	150	419	98,681	-	-	-	-
2005	111	147	461	92,033	-3	-3	42	-6,648
2006	107	141	561	91,748	-4	-6	100	-285
2007	104	133	616	93,036	-3	-8	55	1,288
2008	98	130	622	91,247	-6	-3	6	-1,789
2009	94	126	600	90,769	-4	-4	-22	-478
2010	93	123	609	89,413	-1	-3	9	-1,356
2011	93	122	537	79,749	0	-1	-72	-9 664
2012	92	121	524	68,552	-1	-1	-13	-11,197
2013	89	119	494	62,161	-3	-2	-30	-6,391
2014	89	117	466	59,368	0	-2	-28	-2,793
2015	86	115	407	58,654	-3	-2	-59	-714
2016	79	106	340	59,347	-7	-9	-67	693
2017	80	106	328	64,264	1	0	-12	4,917
2018	78	104	320	69,058	-2	-2	-8	4,794
2019	71	100	312	73,155	-7	-4	-8	4,097
2020	70	101	308	76,856	-1	1	-4	3,701
2021	64	100	294	82,022	-6	-1	-14	5,166

Source: Authors' own elaboration. Data source DGEEC - Directorate General for Higher Education Statistics - https://www.dgeec.medu.pt/art/ensino-superior/bases-de-dados - Enrolled students.
Methodological note: The count of institutions and organic units is based on the national identification number (NID) of the DGEES and not on the public utility register of the educational establishment.

Analysing M&As based on literature review on the topic and the adaptation of the definitions to the specific context of the Portuguese HE system, resumed in Table 3, it is clear that there is a heterogeneous set of changes between HEIs and are transformations that suggest multi-organizational collaborations and collaborative strategies (Clarke, 2007) between HEIs belonging to the same founding body that deserves future research. The existence of a complex set of regulatory changes, together with market constraints, may be among the reasons why PHEIs have opted to replace organic growth with M&A and, in other cases, to close less viable HEIs.

Table 3 - *Classification of Institutional Transformation Events in Portuguese Private Higher Education (2004–2022)*

Year	Legislative act (EN)	Type of event	ETER ID	HEIs envolved (National ID]	Concept	Number of Institutions Involved	Academic similarity/ complementary	Strategy and Motivation	Changes in Legal Status	Changes in scope/ nature	Initiative	Changes in Organizational Structure	Changes in Ownership
2004	Decree-Law No. 194/2004, of August 17	Creation (by Absortion/merger)	PT00 70	4375; 4312; 4363	Merger/ Absortion	Twin mergers	Similar academic profiles and localization	Efficiency-driven merger; Market-driven merger; Survival merger	Creation of New Entity (new establishment, with the nature of a non-integrated university institute, absorbs two institutes with a polytechnic nature)	Politechnic education to University education	Voluntary mergers	Centralization of campus	--
		Closure (by merger/integration)	#N/D	4312; 4363	Closure (by merger/integration)	--	--	--	--	--	--	--	--
2004	Decree-Law No. 195/2004, of August 17	Creation and operation	PT00 79	2402	Split-off	--	Same academic profiles	--	Creation of New Entity (new establishment, with the nature of university)	It gives rise to an autonomous institute while inheriting its legacy of courses operating in the samer location.	--	--	--
		Creation and operation	PT01 43	2405									

2005	Decree-Law No. 56/2005, of March 3	Closure (by merger/integration)	#N/D	4312; 4292	Closure (by merger/integration)	--	--	--	--	--	--	--	--
		Closure (by merger/integration)		4361; 4292	Closure (by merger/integration)	--	--	--	--	--	--	--	--
		Creation (by integration/merger)	PT0120	4292; 4312; 4361	Merger/ Absortion/ Consolidation	Twin mergers	Similar academic profiles and localization	Efficiency-driven merger; Market-driven merger	Creation of New Entity (new establishment, with the nature of Polithecnic Institute)	--	Voluntary mergers	The higher institutes cease to exist autonomously and are merged into a politecnic institute. All study cycles and authorizations are transferred to the new HEI.	--
2005	Notice No. 2734/2005 (2nd series), of March 16	Change of name	PT0081	4032; n.a.	Aquisition	Twin mergers	Same courses, degrees and localization	Expansion of the acquiring entity's activities and the survival or continuity strategy of the acquired entity	No new legal identity or status (changed the denominati on).	--	Forced mergers. The integration or sale of the institution results from the deterioration of its economic and financial situation following	The acquired HEI loses its identity and becomes part of the acquiring HEI. No new legal identity is created in this process (changed the denominati on).	Transfer of ownership between two non-profit cooperatives
	Notice No. 2735/2005 (2nd series), of March 16	Transfer of ownership											

											a political and judicial scandal that would have led to its closure.		
2005	Decree-Law No. 82/2005, of April 20	Creation (by Absortion/merger)	PT0136	4385; n.a..; 4364	Merger/ Absortion	Twin mergers	Similar academic profiles and localization	Efficiency-driven merger; Market-driven merger; Survival merger	Creation of New Entities	Politechnic education to University education	Voluntary mergers	Centralization of campus	--
		Closure (by merger/integration)	#N/D	4364; 4385 n.a.; 4385	Closure (by merger/integration)	--	--	--	--	--	--	--	--
2006	Notice No. 3103/2006 (2nd series), of March 13	Merger/Absortion	PT0121	4200; 4250	Merger/ Absortion	Twin mergers	Similar academic profiles and localization	Efficiency-driven merger; Market-driven merger; Survival merger	--	No changes. The nature non-integrated politechnic institute absorbs one institution also with a polytechnic nature.	Voluntary mergers	Centralization of campus	--
		Closure (by merger/integration)	#N/D	4250	Closure (by merger/integration)	--	--	--	--	--	--	--	--

2006	Notice No. 8572/2006 (2nd series), of August 21	Transfer of ownership	#N/D	4310; 4127	Aquisition and merger	Multi-partner mergers: A merger involving three or more institutions.	Similar academic profiles and localization	Efficiency-driven merger; Market-driven merger; Survival merger	Creation of New Entity (new establishment, with the nature of a non-integrated polytechnic that absorbs two HEIs with a polytechnic nature)	The acquired and merged HEI retains its polytechnic nature but becomes part of a for-profit educational group	Voluntary mergers	Changes in organization structure by integration in other founding body	Transfer of ownership from a non-profit organisation (cooperative) to a for-profit organisation (joint stock company)
		Creation (by integration/merger)	PT0123	4275; 4127; 4310	Aquisition and consolidation								
		Closure (by merger/integration)	#N/D	4310; 4127	Closure (by merger/integration)	--	--	--	--	--	--	--	--
2006	Order No. 21921/2006, of October 27	Transfer of ownership	#N/D	4511	Aquisition and integration	Twin mergers	Similar academic profiles and localization. Merged HEI offer programs in the same field of studies	Expansion of the acquiring entity's activities and the survival or continuity strategy of the acquired entity	The acquired and integrated institution retains its university status but ceases to exist as an autonomous entity. Institute is converted in a organic unit of the university	--	--	Changes in organization structure by integration in other founding body	Transfer of ownership between two non-profit cooperatives
		Integration of HEI (acquisition)	PT0077	2400; 4511	Aquisiton and integration					Institute is converted in a organic unit of the university	Voluntary mergers	The integrated institute is coordinated by the University and operates in synergy with other teaching	The acquired institute is integrated into another founding entity, also a non-

												and research units.	profit organization with the same legal structure (cooperative)
		Closure (by merger/integration)	#N/D	4511	Closure (by merger/integration)	--	--				--	--	
2006	Order No. 25837/2006, of December 20	Transfer of ownership	PT0113	4125	Aquisition	--	--	Market-driven merger; Survival merger	No changes	The acquired HEI retains its polytechnic nature and non-profit scope	Voluntary mergers	Changes in organization structure by integration in other founding body	Transfer of ownership between two non-profit associations
2007	Order 20163/2007, of September 4	Compulsory Closure	#N/D	2600	Compulsory Closure (for-profit)	--	--	**--**	--	**--**	--	**--**	--
2008	Order No. 22388/2008, of August 29	Conversion (Change of Nature)	#N/D	2300	Institutional Restructing	Single HEI (no new HEI)	Same academic profiles and localization	Survival or continuity strategy	Reconversion of a University into a Non-University Integrated Higher Education Institution	Keeps the scope of universitary education	Forced by regulatory requirements	Reduces the level of requirements for accreditation and operation	--

2008	Order No. 25846/2008, of October 15	Compulsory Closure	#N/D	4030; 4031; 4033	Compulsory Closure (non-profit)	--	--	--	--	--	--	--	--
2009	Order No. 8510/2009, of March 25	Compulsory Closure	#N/D	4170	Compulsory Closure (non-profit)	--	--	--	--	--	--	--	--
2009	Order No. 12557/2009, of May 27	Compulsory Closure	#N/D	2300; 2302; 4425	Compulsory Closure (non-profit)	--	--	--	--	--	--	--	--
2009	Decree-Law No. 221/2009, of September 8	Change of nature and name	PT0067	4450	Institutional Restructing	--	--	--	Changes the nature from a non-integrated university school to university institute,	--	--	New denomination and modification of operating requirements to align with the specificity of the new status.	--
2009	Order No. 23455/2009 (2nd series), of October 26, 2009	Transfer of ownership	#N/D	4351	Aquisition	--	--	Market-driven merger; Survival merger	--	--	--	Changes in organization structure by integration in other founding body	Transferring ownership of a for-profit entity to a non-profit entity

2010	Order No. 13624/2010, of August 25	Transfer of ownership	#N/D	4090; 4440	Aquisition and integration	--	--	Expansion of the acquiring entity's activities and the survival or continuity strategy of the acquired entity	No new entities. The acquired loses autonomy a became one of the basic units, legally recognized and operating under the umbrella of the Institute	Keeps the scope of politechnic education	Voluntary mergers	Changes in organization structure by integration in other founding body	Transfer of ownership between two non-profit entities
		Aquisition and integration	PT0137	4440; 4090								The integrated higher school is coordinated by the Institute and operates in synergy with other basic units.	The acquired institute is integrated into another founding entity, also a non-profit organization with the same legal structure (cooperative)
		Closure (by merger/integration)	#N/D	4090	Closure (by merger/integration)								
2010	Order No. 15048/2010, of October 1	Voluntary closure	#N/D	4050	--	--	--	--	--	--	--	--	--
2012	Decree-Law No. 206/2012	Closure (by merger/integration)	PT0044	4111	--	--	--	--	--	--	--	--	--

	, of August 31	Closure (by merger/integration)	PT0045	4112	--	--	--	--	--	--	--	--	--
		Creation (by integration/merger)	PT0139	4560; 4111; 4112	Merger/ Absortion/ Consolidation	Twin mergers	Similar academic profiles and localization	Efficiency-driven merger; Market-driven merger	Creation of New Entity (new establishment, with the nature of University Institute)	No changes	Voluntary mergers	The higher schools cease to exist autonomously and are merged into a university institute. All study cycles and authorizations are transferred to the new HEI.	--
2013	Notice No. 721/2013 (2nd series), of January 16	Change of name	PT0115	4107	Institutional Restructing	--	--	Rebrand	New name	--	--	--	--
2013	Decree-Law No. 17/2013, of January 30	Institutional Restructing	PT0054	4295	Institutional Restructing	--	--	--	Changes the nature from a non-integrated university school to a non-integrated polytechnic institution.	University education to Politechnic	--	Modification of operating requirements to align with the specificity of the new status.	--

2013	Decree-Law No. 86/2013, of June 26	Change of nature and name	PT0064	4352	Institutional Restructing	--	--	--	Changes the nature from a non-integrated university school to a non-integrated polytechnic institution.	University education to Politechnic	--	New denominati on and modificatio n of operating requiremen ts to align with the specificity of the new status.	--
2013	Decree-Law No. 87/2013, of June 26	Change of nature and name	PT0063	4350	Institutional Restructing	--	--	--	Changes its status from a non-integrated university education institution to a university	University education	--	New denominati on and modificatio n of operating requiremen ts to align with the specificity of the new status.	--
2013	Decree-Law No. 99/2013, of July 24	Change of nature and name	#N/D	4309	Institutional Restructing	--	--	--	Changes the nature from a non-integrated university school to a non-integrated polytechnic institution.	University education to Politechnic	--	New denominati on and modificatio n of operating requiremen ts to align with the specificity of the new status.	--

2013	Decree-Law No. 111/2013, of August 2	Creation and operation	PT0077 PT0078	2400 2401	Split-off	--	Complementary programs and location. The split-off expands the geographic academic offerings.	Expansion of the activities	Creation of New Entity (new establishment, with the nature of university)	No changes	--	An autonomous HEI is established; however, it remains an operation of continuity in the short term, as the study cycles that were already authorized continue to operate in the existing facilities previously owned by Universidade Lusíada in Porto.	--
2013	Decree-Law No. 147/2013, of October 22	Change of nature and name	PT0141	4570	Institutional Restructing	--	--	--	Changes the nature from a non-integrated university school to a non-integrated polytechnic institution.	University education to Politechnic	--	New denomination and modification of operating requirements to align with the specificity of the new status.	--

2013	Notice No. 13029/2013, of October 24	Change of name and localization	PT0117	4155	Institutional Restructing	--	--	Rebrand and Expansion of the activities to other campus	Rename	--	--	New name and localization	--
2014	Decree-Law No. 6/2014, of January 14	Change of nature and name	PT0051	4358	Institutional Restructing	--	--	--	Changes the nature from Institute to University Institute.	The change in status entails authorization to confer the doctoral degree.	--	New denomination and modification of operating requirements to align with the specificity of the new status.	--
2014	Decree-Law No. 39/2014, of March 14	Creation and operation	#N/D	4157	Institutional Restructing	--	Similar academic profiles in a new localization	Expansion of the entity's activities	Creation of a New entity	No changes	--	Modification of operating requirements to align with the specificity of the new independnt entity,	--
2014	Notice No. 7210/2014 (2nd series), of June 18	Voluntary closure	#N/D	4351	Voluntary closure (non-profit)	--	--	--	--	--	--	--	--

2014	Notice No. 7211/2014 (2nd series), of June 18	Voluntary closure	#N/D	4307	Voluntary closure (non-profit)	--	--	--	--	--	--	--	--
2015	Notice No. 2083/2015 (2nd series), of February 25	Voluntary closure	PT0049	4255	Voluntary closure (non-profit)	--	--	--	--	--	--	--	--
2015	Order No. 2349/2015, of March 6	Closure (by merger/integration)	PT0078	2401	Closure (by merger/integration)	--	--	--	--	--	--	--	--
			PT0079	2402	Closure (by merger/integration)	--	--	--	--	--	--	--	--
		Creation (by integration/merger)	PT0143	2405; 2401; 2402	Merger/ Absortion/ Consolidation	Twin mergers	Similar academic profiles	Efficiency-driven merger; Market-driven merger	Creation of New Entity (new establishment, with the nature of University Institute)	No changes	Voluntary mergers	The merged HEI cease to exist autonomously and are merged into a new university institute. All study cycles and authorizations are transferred to the new HEI with	--

												multi campus.	
2015	Order No. 3086/2015, of March 26.	Conversion (Change of Nature)	#N/D	4020	Institutional Restructing	--	--	--	Changes the nature from a non-integrated university school into a non-integrated polytechnic higher education institution	University education to Politechnic education	--	Modification of operating requirements to align with the specificity of the new status.	--
2015	Decree-Law No. 56/2015, of April 20	Change of name and localization	PT01 26	4271	Institutional Restructing	--	--	Expansion of the activities	--	--	--	New name and localization	--
2015	Decree-Law No. 57/2015,	Change of nature and name	PT00 52	4261	Institutional Restructing	--	--	--	Changes the nature from	University education, gaining the	--	New denomination and	--

	of April 20		#N/D	4650					Higher Education Institute to University Institute.	ability to confer doctoral degrees.		modification of operating requirements to align with the specificity of the new status.	
2015	Notice No. 6540/2015 (2nd series), of June 12	Transfer of ownership	PT0133	4460	Aquisition	--	--	Market-driven merger; Survival merger	No changes	--	Voluntary mergers	Changes in organization structure by integration in other founding body	Transfer of ownership between two for-profit companies
2015	Decree-Law No. 227/2015, of October 9	Creation and operation	#N/D	4011; 4010	Split-off	--	Similar academic profiles	Expansion of the group activities	Creation of New Entity (new establishment, with the nature of polytechnic higher education institution.	--	--	Although it is an autonomous entity, the new HEI [NID 4011] begins its activity by adopting the legacy and facilities of its founding umbrella entity [NID 4010], whose study programmes had	--

												already been authorised to operate in the same location.	
2015	Decree-Law No. 228/2015, of October 9	Change of nature and name	PT0062	4354	Institutional Restructing	--	--	--	Changes the nature from auniversity school to polytechnic institution.	University education to Politechnic	--	New denominaton and modificatio n of operating requiremen ts to align with the specificity of the new status.	--
2015	Decree-Law No. 229/2015, of October 9	Change of localization	PT0133	4460	Institutional Restructing	--	--	Expansion of the activities	--	--	--	New localization	--
2016	Notice No. 912/2016 (2nd series), of January 27 (correcte d by Rectificat ion Declarati on No.	Voluntary closure	PT0050	4290	Voluntary closure (non-profit)	--	--	--	--	--	--	--	--

	138/2016, of February 12)												
2016	Notice No. 2386/2016 (2nd series), of February 25	Voluntary closure	#N/D	4099	Voluntary closure (non-profit)	--	--	--	--	--	--	--	--
2016	Notice No. 4739/2016 (2nd series), of April 8	Change of name	PT0114	4141	Institutional Restructing	--	--	Rebrand	New name	--	--	--	--
2016	Order No. 6006/2016, of May 5	Conversion (Change of Nature)/ Split-off	PT0072	2700	Institutional Restructing	--	--	--	Conversion of an University into a non-integrated university school	Loses the multi nature (university + polytechnic). The educational offer becomes exclusively of a university nature.	Forced by regulatory requirements	The conversion implied the loss of an organic unit. It loses scale and the educational offer of a polytechnic nature. Reduces the level of requirements for accreditation and operation	--

			PT0148	4590; 2700		--	--	--	Conversion of an organic unit (polytechnic higher school) of a university into a polytechnic higher education institution.	Strengthening of the polytechnic nature.	Forced by regulatory requirements	Gains institutional autonomy, becoming an independent institution from the university. Becomes an autonomous institution and is required to meet the requirements for accreditation and operation as a new institution.	--
2016	Decree-Law No. 25/2016, of June 9	Change of nature and name	PT0101	4097	Institutional Restructing	--	--	Rebrand	Become a polytechnic higher education school	Modification of its educational project to polytechnic higher education school, dedicated to teaching, applied research, and providing services in	--	New denomination and modification of operating requirements to align with the specificity of the new status and fields of study.	--

										the field of health.			
2016	Order No. 14278/2016 (2nd series), of November 11	Compulsory Closure	PT0047	4120	Compulsory Closure (non-profit)	--	--	--	--	--	--	--	--
2016	Notice No. 15192/2016 (2nd series), of December 5.	Change of name	PT0128	4298	Institutional Restructing	--	--	Rebrand	New name	--	--	--	--
2017	Notice No. 3194/2017 (2nd series), of March 28	Voluntary closure	PT0119	4160	Voluntary Closure (non-profit)	--	--	--	--	--	--	--	--
2017	Notice No. 3199/2017 (2nd series), of March 28	Voluntary closure	#N/D	4079	Voluntary Closure (non-profit)	--	--	--	--	--	--	--	--
2017	Notice No. 5789/2017 (2nd series),	Compulsory Closure	PT0047	4120	Compulsory Closure (non-profit)	--	--	--	--	--	--	--	--

	of May 24												
2017	Notice No. 6557/2017 (2nd series), of June 9	Voluntary closure	#N/D	4303	Voluntary Closure (for-profit)	--	--	--	--	--	--	--	--
2017	Notice No. 6558/2017 (2nd series), of June 9	Voluntary closure	PT0093	4095	Voluntary Closure (non-profit)	--	--	--	--	--	--	--	--
2017	Notice No. 6948/2017 (2nd series), of June 23	Change of name	PT0133	4460	Institutional Restructing	--	--	Rebrand	New name	--	--	--	--
2017	Notice No. 11716/2017 (2nd series), of October 3	Voluntary closure	#N/D	4299	Voluntary Closure (non-profit)	--	--	--	--	--	--	--	--
2017	Decree-Law No. 155/2017, of December 28	Change of name	PT0099	4089	Institutional Restructing	--	--	Rebrand	New name	--	--	--	--

2017	Decree-Law No. 155/2017, of December 28	Change of name and localization	#N/D	4309	Institutional Restructing	--	--	Expansion of the activities (concentration in Lisbon municipality)	--	--	--	New name and localization	--
2017	Decree-Law No. 155/2017, of December 28	Change of nature and name	PT0053	4260	Institutional Restructing	--	--	--	Reclassified as a university institute and renamed	--	--	New denomination and modification of operating requirements to align with the specificity of the new status.	--
2018	Notice No. 14910/2018 (2nd Series), of October 17	Voluntary closure	PT0086	4068	Voluntary Closure (non-profit)	--	--	--	--	--	--	--	--
2019	Decree-Law No. 4/2019, of January 14	Change of status and integration as an organic unit of a Polytechnic Institute.	PT0149	4600; 4077; 4309; 4102	Merger/ Absortion/ Consolidation	Twin mergers	Similar academic profiles and localization	Efficiency-driven merger; Market-driven merger	Creation of New Entity (new establishment, with the nature of Polithecnic Institute)	--	Voluntary mergers	The higher schools cease to exist autonomously and are integrated as organic units of the	--

		Closure (by merger/integration)	PT0095	4077	Closure (by merger/integration)	--	--	--	It loses autonomy and transitions from a higher education school to an organic unit of a polytechnic institute. The nature of a education school remains unchanged.	--	--	polytechnic institute. All study cycles and authorizations are transferred to the new higher education institution (HEI).	
		Closure (by merger/integration)	#N/D	4309	Closure (by merger/integration)	--	--	--		--	--		
		Closure (by merger/integration)	PT0107	4102	Closure (by merger/integration)	--	--	--		--	--		
2019	Decree-Law No. 4/2019, of January 14	Conversion (Change of Nature)	PT0148	4590	Institutional Restructing	Single HEI (no new HEI)	Same academic profiles and localization	Survival or continuity strategy	Conversion of an organic unit of the University into a non-integrated higher education polytechnic institution	University education to Politechnic education and Vice Versa	Forced by regulatory requirements	Reduces the level of requirements for accreditation and operation	--
2019	Notice No. 4460/2019 (2nd Series), of March 18	Voluntary closure	PT0131	4305	Voluntary Closure (non-profit)	--	--	--	--	--	--	--	--

2019	Decree-Law No. 77/2019, of June 4	Creation and operation	PT0150	4610	New HEI	--	Diverse academic profiles	Expansion of activities	New HEI with the nature of a polytechnic higher education institution, comprising six academic units. Authorized to provide study programs accreditaed by the A3ES to NID 4275	The new institution inherits the legacy of operating authorizations and study programs from two polytechnic higher education institutions (NID 4104 and NID 4275), expanding its scope across various fields of specialization within its academic units.	--	New HEIs with six organic units	--
2019	Order No. 7111/2019 (2nd series), of August 9	Compulsory Closure	PT0113	4125	Compulsory Closure	--	--	--	--	--	--	--	--

2019	Order No. 7515-B/2019, of August 22; Notice No. 18428/2019, of November 19	Compulsory Closure	PT0054	4295	Compulsory Closure (for-profit)	--	--	--	--	--	--	--	--
2019	Notice No. 13641/2019 (2nd series), of September 2	Voluntary closure	PT0096	4078	Voluntary Closure (non-profit)	--	--	--	--	--	--	--	--
2019	Notice No. 13641/2019 (2nd series), of September 2	Voluntary closure	#N/D	4081	Voluntary Closure (non-profit)	--	--	--	--	--	--	--	--
2019	Notice No. 13643/2019, of September 2	Voluntary closure	PT0136	4385	Voluntary Closure (non-profit)	--	--	--	--	--	--	--	--

2019	Notice No. 14027/2019, of September 10	Transfer of ownership and denomination	PT0145	4110	Aquisition/ Transfer of ownership	Single HEI (no new HEI)	--	Market-driven merger; Survival merger	Changes the denomination	--	--	Changes in organization structure by integration in other founding body	Transfer of ownership between two non-profit organization
2019	Order No. 8437/2019 (2nd series), of September 24	Compulsory Closure	PT0088	4074	Compulsory Closure (non-profit)	--	--	--	--	--	--	--	--
2019	Order No. 8723/2019 (2nd series), of October 2	Compulsory Closure	PT0066	4150	Compulsory Closure (for-profit)	--	--	--	--	--	--	--	--
2020	Notice No. 7101/2020 (2nd Series), of April 28	Voluntary closure	#N/D	4380	Voluntary Closure (non-profit)	--	--	--	--	--	--	--	--
2020	Notice No. 7102/2020 (2nd Series),	Voluntary closure	#N/D	4005	Voluntary Closure (non-profit)	--	--	--	--	--	--	--	--

	of April 28												
2020	Decree-Law No. 45/2020, of July 23	Creation and operation	PT0151	4620; 2750	New HEI	--	--	Expansion of the group activities	Creation of New Entity (new establishment, with the nature of a non-integrated polithecnic institute)	--	--	Although it is an autonomous entity, it begins its activity by receiving a legacy created by the umbrella entity of the group. It is initially authorized to offer polytechnic study cycles accredited by A3ES (Agency for Assessment and Accreditation of Higher Education) and registered by DGES (Directorate-General for Higher Education), previously	--

												operating within the polytechnic subunits of Universidade Fernando Pessoa [NID 2750] (Fernando Pessoa University).	
2020	Decree-Law No. 65/2020, of September 11	Change of nature and name	PT0147	2710	Institutional Restructing	--	--	--	Changes the name and the nature of the HEI from a university school to university instutue.	--	--	New denominationand modification of operating requirements to align with the specificity of the new status.	--
2020	Notice No. 15197/2020, of October 1.	Change of name	PT0125	4270	Institutional Restructing	--	--	Rebrand	New name	--	--	--	--
2021	Decree-Law No. 61/2021, of July 21	Change of nature and name	PT0051	4358	Institutional Restructing	--	--	Expansion and reinforcement of the university statute and rebrand.	Changes the nature from a university institute to university.	New denominationand modification of operating requirements to align	--	--	--

			PT0153	4630		--	--			with the specificity of the new status. A new university that inherits the legacy of the preceding university institute [NID 4358]. In practice, it is not a completely new institution but rather an institutional restructuring to achieve a higher recognition status.	--	--	--
2021	Decree-Law No. 61/2021, of July 21	Creation and operation	PT0152	4625; 4101	--	Twin mergers	Similar academic profiles and localization	Efficiency-driven merger; Market-	Creation of New Entity (new establishment, with	A polytechnic institute was created	Voluntary mergers	--	--

	Closure (by merger/integration)	PT0108	4101	Closure (by merger/integration)	--	--	driven merger	the nature of Politecninc Institute, that absorbs one higher education school).	with two organic units (higher education schools). The newly established Polytechnic Institute is initially authorized to offer study programs and courses accredited by A3ES and registered with the Directorate-General for Higher Education (DGES), via the higher education institutions now integrated into its academic structure.	It ceases to exist as an autonomous institution and becomes part of the new HEI's organizational structure.	--

2021	Decree-Law No. 61/2021, of July 21	Creation and operation	#N/D	4531; 4640	Split-off	--	Same academic profiles	--	Creation of New Entity (new establishment, with the nature of non-integrated polytechnic higher education institution)	It gives rise to an autonomous institute while inheriting its legacy of courses operating in another location.	--	--	--
2021	Notice No. 15456/2021 (2nd Series), of August 18	Voluntary closure	PT0098	4065	Voluntary Closure (non-profit)	--	--	--	--	--	--	--	--
2021	Decree-Law No. 79/2021, of October 4	Merger/Absorption	PT0077	2400; 20405	Merger/ Absortion	Twin mergers	Comun academic profiles and localization	Efficiency-driven merger	--	The university absorbs an institution that resulted from its own separation. It now operates as a multi-campus institution under a unified framework.	Voluntary mergers	It now operates as a multi-campus institution in Lisbon, Porto, and Vila Nova de Famalicão.	--

		Closure (by merger/integration)	PT0143	2405	Closure (by merger/integration)	--			--	It ceases to exist as an autonomous entity, being absorbed and becoming one of the campuses of the integrating university.	Voluntary mergers	The organizational structure is absorbed and merged with the receiving university.	--
2021	Decree-Law No. 79/2021, of October 4	Creation and operation	PT0145	4110	Institutional Restructing	--	--	Expansion and rebrand	New name	--	--	--	--
2021	Decree-Law No. 79/2021, of October 5	Creation and operation	PT0115	4107	Institutional Restructing	--	--	Expansion and rebrand	New name	--	--	Institution with multi-campus (multi academic units/ Higher Education Schools)	--
2022	Order No. 11138/2022, of September 7 + Notice	Creation (by integration/merger)	#N/D	2900; 2800; 4032	Merger/ Absortion	Multi-partner mergers: A merger involving three or more	--	Efficiency-driven merger; Market-driven merger	A new entity is formed, absorbing two universities.	--	Voluntary mergers	A new entity is formed, absorbing two universities along with	--

No. 20579/2022, of October 26	Closure (by merger/integration)	PT0080	2800	Closure (by merger/integration)	institutions.	It ceases to exist as an autonomous entity and becomes part of a multi-campus university.	their study programs and operating authorizations from the integrated HEIs. These institutions continue to operate in the same locations, functioning as campuses (Porto and Lisbon).
	Closure (by merger/integration)	PT0081	4032	Closure (by merger/integration)		It ceases to exist as an autonomous entity and becomes part of a multi-campus university.	

Source: Authors' own elaboration

The analysis suggests that restructurings in HE occur in response to regulatory factors, along with economic and strategic factors. The regulatory factors include: in 2003, Law No. 1/2003, of 6 January, which created the legal regime for the development and quality of HE - RJDQES (which seeks to clarify the different nature of training in the university and polytechnic subsystems); between 2006 and 2007, Decree-Law No. 74/2006, of 24 March, which approved the legal regime for the development and quality of HE: Decree-Law No. 74/2006, of 24 March, which approved the legal regime for higher education degrees and diplomas (RJGDES); Law No. 38/2007, of 16 August, amended by Law No. 62/2007, of 10 September (RJIES); Law No. º 38/2007, of 16 August (RJAES); Decree-Law No. 369/2007, of 5 November, which created A3ES; in 2013 Decree-Law No. 115/2013, of 7 August, which made several updates to the conformation of Degrees and Diplomas; and in 2018 Decree-Law No. 65/2018, of 16 August, which established new requirements for accrediting study cycles, as well as the changes to the basis of higher education funding made by Law No. 37/2003, of 22 August, and Law No. 49/2005, of 30 August.

The 2004-2009 and 2015-2019 periods saw the highest peak in HEIs closures, 8 HEIs and 10 HEIs respectively, resulting from A3ES evaluation processes, with the majority of closures being voluntary both in non-profit and for-profit sector of HE.

Merger/Absorption processes also fluctuated in the period observed in waves, involving a total of 14 HEIs. One of the most common restructuring formats observed involves the merger of two or more institutions into a single entity and the absorption of the smaller institution by the larger one. Most of these events took place between 2004 and 2006, indicating a period of accelerated consolidation that restarted between 2019 and 2022.

Acquisition/transfer of ownership processes peaked in 2009, with the data revealing a trend towards the acquisition of small PHEIs by larger educational groups. Many of these processes involved the subsequent merger or integration of the establishments of the receiving HEIs. This suggests a search for greater financial stability and expansion by private HE groups.

The residual Consolidation processes analysed (3) are the result of mergers/integrations of HEIs operated by three large groups: IAD, Jean Piaget and Lusíada University. This type of event occurred in a spread-out pattern over time.

Institutional restructuring is the most recurrent process analysed, with a peak between 2013 and 2017. Most institutions underwent administrative and academic reformulations without formal merger or acquisition changes, with many of these changes being at the level of the name (rebrand), changes in location (expansion or concentration of campuses) and changes to the legal nature of the establishment, mostly by regulatory force. In other words, to adapt the organization's legal status to meet accreditation requirements. Most of the processes are the result of voluntary acts by the HEIs, except for events classified as reconversion, which are the result of an imposition by the authorities when the accreditation requirements for the registered legal status are not met.

Split-offs are residual. In some cases, institutions that had been absorbed or integrated ended up splitting up again, and others returned to operate in a merged form (e.g. Instituto Superior de Tecnologias Avançadas and universities of the Lusíada group).

The motivations and strategy behind the changes are mostly related to requests for the tutelage to change or reformulate recognition of public interest. There are no disruptive changes to the scope and nature of these processes, insofar as the legal framework restricts

them, and the requirements for accreditation and authorisation to operate study cycles cannot be altered. It is clear that the regulatory environment means that M&A in HE requires strategic alignment in terms of academic standards, and HEIs must ensure compliance with the requirements defined by the regulatory bodies in order to guarantee compliance and avoid barriers.

It has also been observed that mergers within the perimeter of the same founding body reflect collective strategy formulations for integration and merger and even split off without compromising identity and values. In the cases observed, there was a full transition of study cycles and authorisations between establishments of the same nature. M&As mostly reflect characteristics of similarity and complementarity.

Nevertheless, there are changes in nature from polytechnic to university education and vice versa, as well as in the degrees of independence and/or autonomy in the M&A processes, which reflect the new legal forms adopted by the merging and receiving organisations.

Finally, M&As are more common between institutions with the same patterns of ownership, i.e. mergers between non-profit HEIs (e.g. between cooperatives, between associations and cooperatives) than between for-profit and non-profit HEIs.

Taken together, these findings suggest that regulatory reforms have had a significant influence on the restructuring of the PHE sector. By imposing compliance requirements, they have influenced the organisational choices available to institutions, thereby urging them to consolidate, integrate and reposition themselves strategically. Nevertheless, this study contributes to the literature in four ways. First, it develops an original longitudinal database of restructuring events in Portuguese PHE. Second, it provides one of the few micro-level analyses of M&A processes in private higher education. Third, it demonstrates how regulatory frameworks shape organisational responses over time. Finally, it advances the concept of constrained adaptation as a lens through which institutional restructuring in highly regulated private higher education systems can be interpreted.

Importantly, the findings suggest M&A should be understood primarily as constrained adaptation rather than strategic expansion, but rather as adaptive responses to systemic constraints. This shifts the analytical perspective from voluntary strategic choice to constrained organisational behaviour, where institutions operate within narrow regulatory and economic margins.

6. Conclusions

The transformation of PHE in Portugal reflects a combination of regulatory challenges and market pressures. M&A emerge as strategies to ensure the sustainability and competitiveness of HEIs. The findings indicate that HEIs adopt adaptive restructuring strategies, aligning internal governance and academic offerings with evolving accreditation norms and regulatory frameworks, particularly post-Bologna reforms. More broadly, the evidence suggests that M&A has become a central mechanism through which PHEIs adjust to changing operating conditions while maintaining institutional viability and accreditation capacity. However, their organisational consequences remain underexplored.

Findings resonate with international studies, which underline that M&A strategies should not be approached as “one-size-fits-all” solutions. HE frameworks need to recognise the structural and cultural diversity of HE systems and HEIs. In the Portuguese case, the legal framework ensures that M&A initiatives safeguard institutional missions, regional roles, and

sectoral diversity. However, while regulatory frameworks act as strong drivers of restructuring, they also risk constraining innovation and institutional strategy.

This study provides one of the first comprehensive, system-level analyses of M&A in Portuguese PHE, offering new empirical evidence on institutional restructuring processes over time. By documenting and classifying restructuring events over nearly two decades, it also contributes to a better understanding of how regulatory and competitive pressures influence organisational change in PHE.

By relating regulatory change with organisational transformation, it demonstrates that M&A are primarily adaptive responses to systemic constraints rather than purely strategic growth mechanisms. These results contribute to the debate on the PHE sector, providing empirical evidence on institutional restructuring and data for comparative longitudinal analyses. Presenting the relationship between different M&A categories and micro-level processes in PHEIs.

The evidence presented suggests that M&A in Portuguese private HE should not be interpreted primarily as instruments of organisational growth. Rather, they constitute adaptive responses to a regulatory environment that simultaneously safeguards quality and restricts the strategic autonomy of institutions. In this sense, restructuring becomes a mechanism through which institutions negotiate survival, legitimacy, and sustainability.

Beyond the Portuguese context, the findings invite broader reflection on the unintended organisational consequences of regulatory expansion in HE systems. Policies designed to enhance accountability and quality may also reshape institutional landscapes by encouraging consolidation, concentration, and new ownership configurations. Understanding these dynamics is therefore essential for policymakers seeking to balance quality assurance with institutional diversity and innovation. Therefore these findings have important implications for policymakers, suggesting that regulatory frameworks not only ensure quality and accountability but also actively shape the structure and evolution of the HE sector.

Future research should move beyond the mapping of legal changes to explore the organisational and performance implications of M&A, particularly in terms of governance, academic integration, and educational outcomes, and the long-term effects of restructuring on PHE sustainability

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AUTHORS' CONTRIBUTIONS (CREDIT)

Conceptualization, MEFF, MLMT; methodology, MEFF, MLMT; software, MEFF; validation, MEFF, MLMT; formal analysis, MEFF; investigation, MEFF; resources, MEFF; data curation, MEFF; writing—original draft, MEFF; writing—review and editing, MEFF, MLMT; visualization, MEFF; supervision, MLMT.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

An in-depth description of the M&A with chronological and interinstitutional mapping of M&A activities that took place in the PHE sector between 2004/05 to 2021/22 can be provided under request to the corresponding author. Such description focuses on the following characteristics of each M&A: HEIs involved, founding body and institutional changes per legal act.

ETHICS STATEMENT

This study is based exclusively on the analysis of legal acts and publicly available institutional data and does not involve human participants or personal data. Therefore, ethical approval and informed consent were not required. The research was conducted in accordance with relevant institutional and national guidelines for research integrity.

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Analysis of blockchain technology as a tool for enhancing audit quality

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Abstract

Auditing plays an indispensable role in ensuring the sustainable and proper functioning of organizations. Recent evidence suggests that blockchain technology can significantly contribute to overcoming current limitations associated with low audit quality. As a technology centered on data security and trust, blockchain offers a reliable environment for recording and verifying financial information, positioning it as a valuable resource for strengthening quality control in auditing processes. This study aims to conduct a bibliometric and systematic analysis of the scientific literature addressing terms such as blockchain and audit quality, based on publications indexed in the Web of Science database. The research addresses theoretical and methodological aspects, focusing on identifying countries with the highest scientific output, influential authors, leading journals, and the most used keywords. The results indicate that the most productive countries are the United States and China. The journals with the highest number of publications include IEEE Access, Electronics, IEEE Internet of Things Journal, and the International Journal of Accounting Information Systems. The analysis revealed five major trends demonstrating that blockchain enhances audit quality by improving security and privacy, facilitating regulatory compliance, increasing efficiency and effectiveness, strengthening IT competencies, and promoting sustainability, thus redefining the assurance paradigm.

Keywords: Blockchain, auditing, audit quality, smart contracts

Introduction

The field of auditing is currently undergoing profound technological transformations, which demand the adaptation of processes to a new digital era that can respond swiftly and securely to organizational objectives. Among the most promising technologies is blockchain, which has the potential to improve audit quality (Fedyk et al., 2022; Corradini et al., 2022) due to its focus on data security and its ability to ensure high levels of data reliability (Wang, 2022). In fact, blockchain technology provides continuous support to auditors by offering a degree of assurance about events occurring simultaneously with, or shortly after, the disclosure of financial information (Corradini et al., 2022). Blockchain acts as a type of smart contract that integrates consensus protocols, mathematical models, and the secure exchange of audit data (Wang et al., 2022). The existing literature on blockchain and auditing remains limited and is primarily centered on the experiences of audit firms, information technology (IT), and their influence on audit quality (Rahman & Ziru, 2022). It also explores the growing expectation that blockchain will transform the accounting profession and, consequently, the quality of audits (Tan & Low, 2019).

Blockchain is designed to establish secure access control strategies for audit transaction recording (Wu et al., 2022). For instance, it can help auditors save time on repetitive tasks such as confirming and verifying balances, allowing them to focus on higher-order functions like designing preventive procedures and performing intelligent data analysis (Elommal &

Manita, 2021). In fact, blockchain is recognized for enhancing audit information security and can potentially improve audit quality by up to 20% (Wang, 2022). Preliminary studies on blockchain and audit quality were conducted by Wang (2022) and Albitar et al. (2020), while other comparative research has investigated the use of big data in auditing, the impact of internet-related technologies on continuous auditing, and how these technologies affect audit quality and efficiency (Mugwira, 2022).

Some studies suggest that blockchain will improve the quality of audit-related information (Spanò, 2022). Others argue that data stored in the cloud can be securely audited using blockchain networks, which enhance security and privacy properties (Wang et al., 2022). A recent study highlights blockchain as a revolutionary solution for auditing, proposing that its features represent a redefinition of Internet 3.0, a new type of decentralized infrastructure or "network of networks" (Mijoska & Ristevski, 2021). Based on these premises, researchers have concluded that auditors' perceptions of blockchain implementation have a significant positive effect on audit quality (Sujanto et al., 2021). Furthermore, blockchain is expected to impact auditing in ways that will reshape the profession (Demirkan et al., 2020).

Previous studies have examined blockchain and auditing from different perspectives. A systematic literature review analysed the contributions of artificial intelligence, blockchain, deep learning, and machine learning to financial auditing (Huson et al., 2024). Other research explored information technologies, including blockchain, within the auditing profession (Mugwira, 2022), while additional studies focused on the intellectual structure of expanded audit reporting (EAR) (Mashayekhi et al., 2024). However, no prior research has specifically analysed blockchain in relation to audit quality.

Given the growing relevance of blockchain's contribution to audit quality, the topic has gained increased research interest among professionals and academics over the past decade. This study seeks to contribute to this evolving field by addressing the following questions: Who are the most influential authors, journals, and countries in the literature? In which directions is the research on this topic currently heading? And what are the predominant research themes over the past seven years concerning the application of blockchain in auditing?

Accordingly, the objective of this research is to conduct a bibliometric and systematic analysis of the scientific literature, addressing the relationship between audit quality and blockchain. To this end, 446 articles published between 2017 and March 2025 were analyzed, focusing on the intersection of blockchain and audit quality. The methodological approach combines bibliometric and systematic analysis techniques, enabling a comprehensive examination of the academic production related to this topic. The data source employed was the Web of Science database, selected for its recognized quality and international scope.

Finally, this study contributes to the existing body of literature by providing a structured overview of current trends, research gaps, and emerging opportunities in the study of audit quality within the context of blockchain adoption. It also offers practical guidance for emerging researchers by identifying key elements and priority areas for future high-impact investigations.

METHODOLOGY

The methodology adopted for this study follows a bibliometric approach, which is a widely accepted and rigorous method used to explore and analyse large volumes of scientific data. This method has been extensively applied in bibliometric research to support the systematic evaluations of scholarly output (Donthu et al., 2021; Brito-Sánchez et al., 2022).

The data were collected from the Web of Science (WoS) database, which is recognized as one of the most important and comprehensive repositories for scientific publications. WoS is especially relevant in the field of Business, Management, and Accounting, and offers powerful tools for tracking, analysing, and visualizing scientific research (Mongeon & Paul-Hus, 2016). Because this study aims to understand a relatively recent phenomenon, no fixed time window was imposed at the outset. Instead, the period of analysis was determined based on the emergence of relevant publications. While the term "blockchain" and its initial applications appeared around 2008, academic articles linking blockchain specifically to audit quality began appearing in 2017. Therefore, the bibliographic search and analysis cover the period from 2017 to March 2025.

The search was limited to peer-reviewed journal articles published in English. Books and conference proceedings were excluded to maintain consistency and academic relevance. A keyword filtering strategy was employed to retrieve the most relevant publications, using the following search combinations: **blockchain** (Topic) and "**audit quality**" (Topic); **blockchain** (Topic) and **auditing** (Topic); **"Financial audit"** (Title) and **blockchain** (Title); **"Smart contracts"** (Title) and **blockchain** (Title) and **audit** (Title).

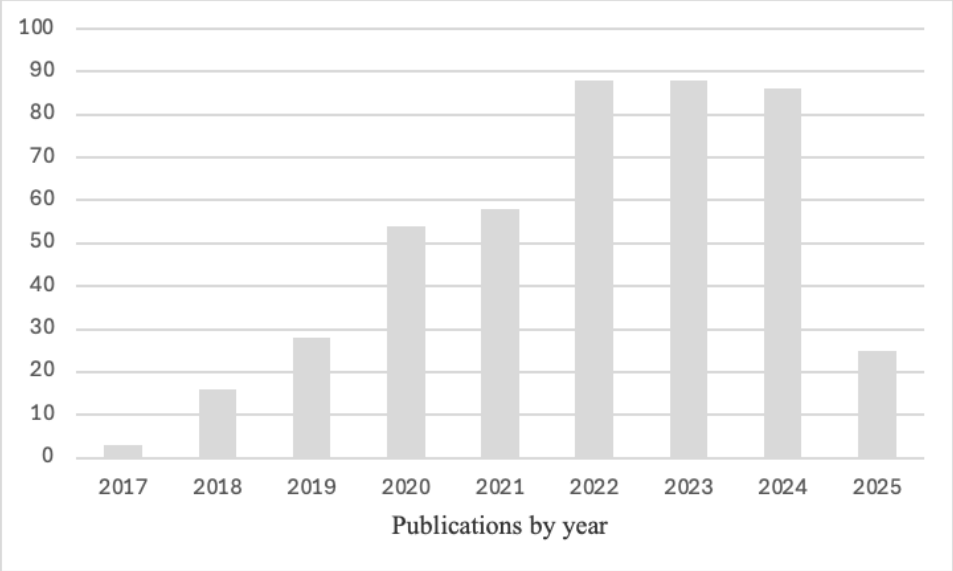
Based on the research objectives and relevance to the field, 1,331 articles were initially identified. After title screening, 585 records were excluded. Abstract review led to the removal of an additional 300 documents, resulting in a final sample of 446 scientific articles. These were organized into a data matrix to extract two key indicators: a quantitative indicator (number of publications) and a qualitative indicator (academic impact measured by citations) (Martínez-Climent et al., 2018).

Finally, a systematic analysis was conducted on a selection of key articles through a close reading of the full texts. The systematic analysis approach refers to the researcher's interpretive evaluation of a segment of the literature to identify theoretical foundations, methodological trends, gaps in existing research, and opportunities for advancing scientific contributions in the field.

RESULTS

This section presents the findings from the bibliometric and systematic analysis of scientific literature on blockchain technology and audit quality (see Figure 1).

Figure 1 - *Publications per year*



The data reveal a growing trend in the annual number of publications addressing the relationship between blockchain technology and audit quality. Interest in this topic began to emerge in 2017, with the most significant growth recorded in 2022. Since then, the volume of publications has remained relatively stable through 2024. It is important to note that the apparent decline in 2025 is due to the data collection cut-off in February and therefore does not represent the full year.

Table 1 - *Number of publications by country*

Countries	N° publications	% of 446
China	204	45,74%
Usa	75	16,82%
Autralia	38	8,52%
India	36	8,07%
England	29	6,50%
Japan	15	3,36%
Canada	13	2,92%
Italy	12	2,69%
Saudi Arabia	12	2,69%
Taiwan	12	2,69%

As shown in Table 1, China and the United States are the most productive countries, followed at a considerable distance by Australia and India. These results highlight the leading contribution of these nations to research on blockchain technology and audit quality.

Figure 2 - *Number of publications per journal*

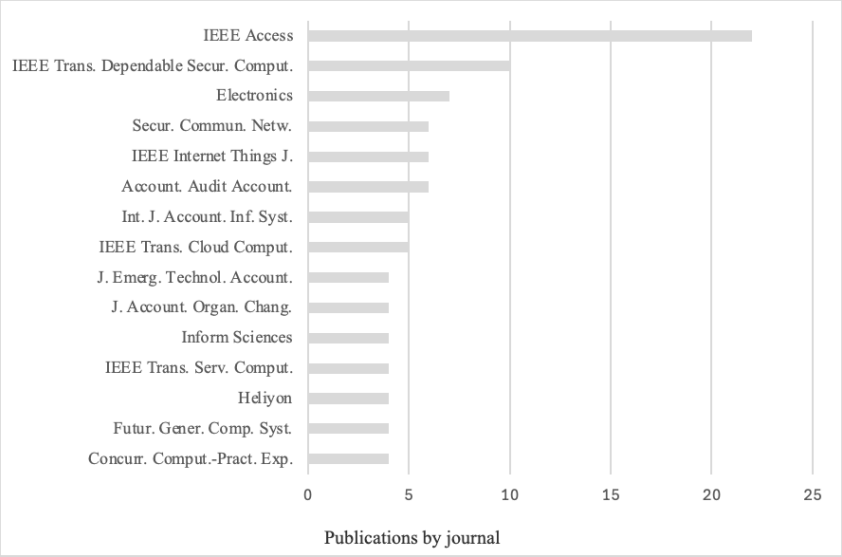
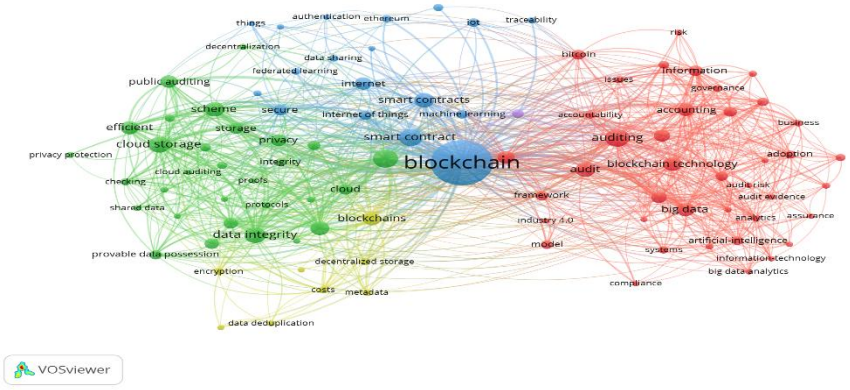


Figure 2 displays the journals with the highest number of publications in the selected dataset. Leading the list is IEEE Access, with an SJR Impact factor of 0.849 (Q1). It is followed by IEEE Transactions on Dependable and Secure Computing, with an SJR of 1.755 (Q1), and Electronics, with an impact factor of 0.615 (Q2). These results highlight the prominence of

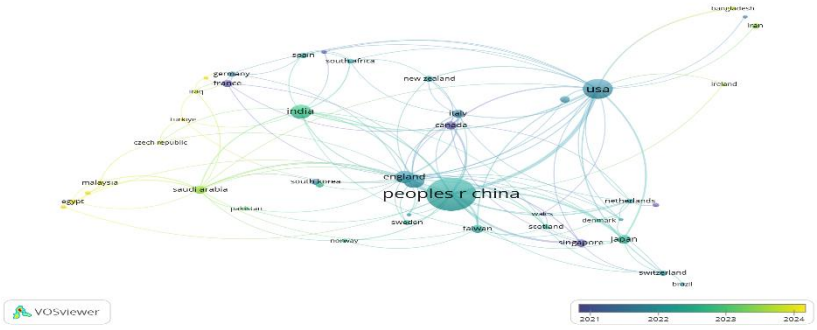
journals in the fields of engineering, cybersecurity, and information systems in publishing research on this topic.

Figure 3 - *Keyword Analysis*



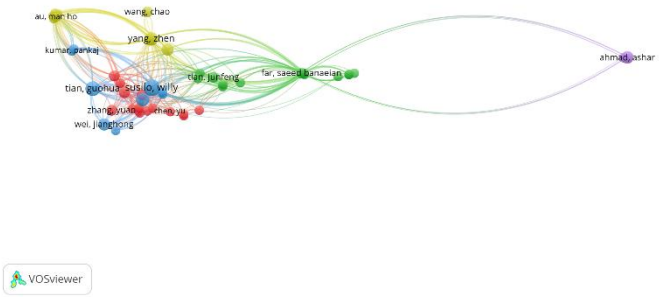
As shown in Figure 3, the most frequently occurring keywords in the analysed articles include: “blockchain technology”, “blockchain,” “auditing,” “audit evidence,” “smart contracts,” and “cloud auditing.” These terms demonstrate a strong thematic coherence, pointing to a growing research trend focused on the analysis of audit evidence in the context of emerging technologies, particularly those linked to artificial intelligence.

Figure 4 - *Co-authorship by country*



As shown in Figure 4, the analysis reveals that the United States and China are the most active contributors to the research on blockchain and audit quality. However, in recent years, there has been a notable increase in international collaboration, evidenced by rising co-authorship between researchers from these leading countries and scholars from Saudi Arabia, Malaysia, Iraq, Egypt, and the Czech Republic. This trend suggests a strengthening of global scientific networks, particularly in areas involving emerging technologies in auditing.

Figure 5 - *Co-citation analysis*



As shown in Figure 5, the co-citation analysis identifies Susilo Willy as the most highly cited author in the dataset, with 9 publications and the highest number of total citations. Other prominent authors include Tiah Huohua (7 publications), Yang Zhen (6), and Yu Shui (5). These authors are recognized as a prominent contributor to the research at the intersection of blockchain technology and auditing.

Table 2 - *Most cited articles*

Author(s)	Title	Journal	Citations	Year
Elnahass, M; Jia, XR; Crawford, L	Disruptive technology and audit risks: Evidence from FTSE 100 companies	Emerging markets review	143	2024
Bakhshi, T; Ghita, B; Kuzminykh, I	A Review of IoT Firmware Vulnerabilities and Auditing Techniques	Sensors	151	2024
Pratama, A	Quality of Accounting Knowledge and Its Impact on Profession	Quality-access to success	155	2024
Sheela, S; Alsmady, AA; Tanaraj, K; Izani, I	Navigating the Future: Blockchain's Impact on Accounting and Auditing Practices	Sustainability	137	2023
Varma, IM; Kumar, N	A comprehensive survey on SDN and blockchain-based secure vehicular networks	Vehicular Communications	218	2023
Hakami, T; Sabri, O; Al-Shargabi, B; Rahmat, MM; Attia, ON	A critical review of auditing at the time of blockchain technology - a bibliometric analysis	Euromed Journal of Business	131	2024
Mashayekhi, B; Dolatzarei, E; Faraji, O; Rezaee, Z	Mapping the state of expanded audit reporting: a bibliometric view	Meditari Accountancy Research	173	2024
Fotoh, LE; Lorentzon, JI	Audit Digitalization and Its Consequences on the Audit Expectation Gap: A Critical Perspective	Accounting Horizons	173	2023
Singh, M; Joshi, M; Sharma, S; Rana, T	How Blockchain Is Transforming Accounting, Auditing and Finance: A Systematic Review	Handbook of big data and analytics in accounting and auditing	151	2023
Zidi, C; Sondi, P; Mitton, N; Wahl, M; Meddahi, A	Review and Perspectives on the Audit of Vehicle-to-Everything Communications	IEEE Access	146	2023

Han, HD; Shiwakoti, RK; Jarvis, R; Mordi, C; Botchie, D	Accounting and auditing with blockchain technology and artificial Intelligence: A literature review	International journal of accounting information systems	137	2023
Abu Salim, T; El Barachi, M; Mohamed, AAD; Halstead, S; Babreak, N	The mediator and moderator roles of perceived cost on the relationship between organizational readiness and the intention to adopt blockchain technology	Technology in society	144	2022
Jayasuriya, DD; Sims, A	From the abacus to enterprise resource planning: is blockchain the next big accounting tool?	Accounting auditing & accountability journal	204	2023
Otia, JE; Bracci, E	Digital transformation and the public sector auditing: The SAI's perspective	Financial accountability & management	137	2022
Secinaro, S; Dal Mas, F; Brescia, V; Calandra, D	Blockchain in the accounting, auditing and accountability fields: a bibliometric and coding analysis	Accounting auditing & accountability journal	133	2021

DISCUSSION

This study shows that incorporating blockchain technology into auditing processes redefines the traditional parameters of audit quality by strengthening the reliability of audit evidence, transparency, and the traceability of accounting information. Several researchers have emphasized the potential of blockchain applications in the field of auditing, especially considering the emerging innovations and challenges faced by organizations and professionals (Lombardi et al., 2021). This technology acts as a catalyst that expands the classic determinants of quality independence, professional competence, and sufficient and appropriate evidence toward a more comprehensive model based on digital security, operational efficiency, technological knowledge, and sustainability.

SECURITY AND PRIVACY

The security and privacy dimension constitutes an essential pillar of trust in audited information. The immutability and cryptographic verifiability of blockchain records mitigate manipulation risks and strengthen audit evidence. Blockchain has the capacity to integrate and interoperate with the Internet of Things (IoT), artificial intelligence (AI), and other emerging technologies to provide higher-quality services to society at large (Demirkan et al., 2020). For this reason, blockchain technology is expected to have a substantial impact on the field of auditing due to its high level of security. By leveraging cybersecurity principles such as confidentiality, integrity, and availability, along with the “three A’s” of authentication, authorization, and auditing, blockchain enhances the transparency of a company’s financial systems.

On the other hand, audit records are often vulnerable to security risks, which can limit transparency (Ahmad et al., 2019). In this context, blockchain is anticipated to naturally bridge the gap in meeting security requirements for audit record management, including assurance of data security, provenance, and transparency. This perspective gives rise to a new paradigm in auditing, composed of two core components: (1) the physical world, which reflects business activities and conditions; and (2) the virtual world, which includes three layers blockchain, smart control, and payment systems that work together to ensure the security of information (Dai & Vasarhelyi, 2017).

Therefore, blockchain technology may contribute to the prevention of earnings manipulation and the assurance of information and data integrity, while also offering other advantages such as reducing repetitive tasks, eliminating the need for reconciliation, enabling

continuous auditing, allowing for the testing of complete datasets instead of samples, and minimizing manual errors all while addressing the critical needs of confidentiality and transparency. Although blockchain may not fully replace the roles of auditors and assurance providers, it could play a relatively central role in the context of accounting and social and environmental reporting. In doing so, blockchain may help resolve data privacy concerns and enable the simplification and acceleration of business processes, enhance cybersecurity protection, and reduce or eliminate the need for intermediaries (Bellucci et al., 2022).

In this context, blockchain enhances the integrity and permanence of information through technical methods based on cryptography and consensus, which make it difficult to alter historical data. However, this does not eliminate all risks associated with the source of data. Research has shown quantifiable impacts in reducing accounting manipulations when blockchain is applied to recording procedures. From the perspective of technical immutability, supported by hashing and consensus mechanisms, confidence is strengthened that records remain unaltered after their inclusion (Hamzah et al., 2024; Alagha & Özçelik, 2025). Regarding the effect on manipulation, evidence indicates that the adoption of blockchain is associated with a significant reduction in discretionary accruals among publicly listed firms, particularly in environments characterized by higher operational risk (Fahdil et al., 2024). Nevertheless, the GIGO ("Garbage In, Garbage Out") limitation remains, as technology cannot correct inaccurate or fraudulent initial inputs; thus, the quality of source data remains critical and requires prior control mechanisms and sound governance design.

Regulation

The regulatory dimension drives the adaptation of regulatory frameworks and international auditing standards, promoting convergence between conventional and digital auditing practices and reinforcing the auditors' legitimacy in technological environments. The scientific literature identifies two main regulatory barriers limiting the widespread adoption of blockchain technology, which are the need to adapt existing regulations and the high implementation costs, which remain the principal obstacles to adoption (Hamzah et al., 2024; Cagle, 2020). In this regard, regulators are expected to play a crucial role in the adoption phase of blockchain within the auditing domain. Regulatory bodies must develop a deep understanding of blockchain technology and its potential impact on businesses and provide appropriate guidance and oversight to prevent misuse and abuse of blockchain and smart contracts. Moreover, regulators should consider how existing accounting standards might be adapted to blockchain-based ecosystems in ways that ensure verifiability and transparency (Dai & Vasarhelyi, 2017).

Regulatory and standardization changes are urgently needed to guarantee independence and sound governance in the intensive use of blockchain. This requires redefining access controls, assigning responsibilities for data alterations, and reconsidering the auditor's role, particularly regarding the risk of compromising independence if involved in system design (Saheb et al., 2025). Furthermore, the growing need for standardization calls for frameworks that enable interoperability among private and consortium blockchains, as well as guidelines for integrating smart contracts with accounting principles, in addition to specialized auditor training (Garanina et al., 2021; Saheb et al., 2025).

Recent research warns that initial findings must be validated over longer time horizons and across diverse contexts before codifying permanent regulatory systems. Therefore, the absence of formal regulation and standards, coupled with the lack of governmental policies and guidelines regarding preferred blockchain technologies, increases audit risk (Dyball & Seethamraju, 2021). Nonetheless, some experts contend that no major changes to existing

standards are needed in response to digitalization, as the core concepts of accounting and auditing remain fundamentally intact (Tiberius & Hirth, 2019).

EFFICIENCY AND EFFECTIVENESS

The efficiency and effectiveness derived from process automation and the immediate availability of real-time data improve the productivity and accuracy of audit work, enabling a more analytical and forward-looking approach to risk assessment. Currently, blockchain technology has gained considerable relevance due to its ability to provide high levels of transparency, security, trust, and efficiency in data management (Fernández-Caramés et al., 2019). Furthermore, it enhances corporate risk management and internal control systems while strengthening investor and public confidence by increasing the transparency and credibility of financial reporting. Its implementation in the auditing field has a significant positive effect on process quality, offering several benefits, including enhanced security in information handling, transparency and traceability of transactions, reduced risk of fraud and data manipulation, and potential cost savings in audit services. As the technology continues to evolve, there is growing interest among audit professionals in studying and integrating it, which could lead to substantial transformations in traditional auditing systems and approaches.

Empirical research has demonstrated significant reductions in accounting manipulations, as well as in the time and costs associated with audit processes. The integration of blockchain technology into accounting and auditing systems promotes transparency, traceability, and trust by generating a distributed, chronologically ordered, and verifiable ledger that enhances information visibility and accessibility among stakeholders and auditors. This characteristic enables real-time auditing, allowing stakeholders to directly verify transactions without intermediaries, thereby increasing the synchronicity and consistency of information across all participants (Hamzah et al., 2024).

The immutable traceability derived from chained records and hashing mechanisms ensures that transaction histories remain fully auditable and verifiable (Alagha & Özçelik, 2025; Andoko & Lindrianasari, 2025). Likewise, the blockchain-based audit trail designed as a decentralized verification mechanisms provides tamper-resistant and immutable records, establishing itself as an effective tool for the early detection of inconsistencies and fraudulent activities.

In auditing practice, the incorporation of artificial intelligence (AI) may render certain procedures less visible to external stakeholders, while simultaneously increasing scrutiny over audit quality (Seethamraju & Hecimovic, 2022). In this context, it is essential for firms to implement AI-based technologies with the aim of providing value-added services to clients and consequently enhancing audit quality. The adoption of such tools also contributes to the development of organizational competencies and capabilities, enabling firms and professionals to prioritize resources based on their specific needs, strengths, and weaknesses. This, in turn, supports the design and implementation of more effective and contextually appropriate solutions.

KNOWLEDGE OF INFORMATION TECHNOLOGIES

Knowledge of information technology is emerging as a new determinant of professional competence; mastery of blockchain and distributed ledger systems is becoming a requirement to ensure the quality of professional judgment and the technical independence of auditors. Within this trend, audit work is increasingly perceived as high-risk. This is largely due to the lack of experience and technical capacity among audit firms to effectively use blockchain applications, including their integration with financial accounting systems. There

is a general unawareness that blockchain could significantly transform a client's business model, streamline commercial processes, and help mitigate inherent risks in a timely manner (Bellucci et al., 2022; Dyball & Seethamraju, 2021).

The adoption of blockchain technology provides both empirical and practical evidence of its capacity to reduce fraud risks and strengthen trust among stakeholders. Several studies demonstrate that the decrease in fraudulent activity is reflected in lower levels of accounting manipulation and a reduction in reported incidents within organizations that have integrated distributed ledger systems into their accounting and financial processes (Cagle, 2020; Fahdil et al., 2024).

Moreover, blockchain functions as a single, verifiable source of truth, reinforcing public and institutional trust, particularly among investors, issuers, and auditors, by mitigating information asymmetries that often undermine transparency in financial reporting processes (Hamzah et al., 2024; Fahdil et al., 2024).

It is important to note that the antifraud benefits are amplified when blockchain implementation is accompanied by robust governance mechanisms, rigorous data provenance verification protocols, and continuous audits of participants and smart contracts, thereby ensuring the overall integrity and reliability of the system.

Moreover, the integration of multiple disciplines such as accounting, programming, mathematics, statistics, accounting software, and blockchain will inevitably impact traditional auditing practices (Jumah & Li, 2020). However, despite technological advances in blockchain within the accounting field, there remains a notable gap in the academic literature. This gap may hinder academics from leading the development of policies and best practices that would foster the broader application and evolution of blockchain technologies in accounting (Demirkan et al., 2020). Gao (2025) proposed a framework called "Block Crypto Audit" to enhance internal audit processes through cryptographic encryption methods and blockchain technology, ensuring secure and transparent audit operations.

Sustainability

Sustainability introduces a conceptual expansion of the audit object. Blockchain facilitates the verification and traceability of non-financial data, particularly in reports related to environmental, social, and governance (ESG) criteria, strengthening the auditor's role as guarantor of the integrity and transparency of sustainable information. Resilient manufacturing is a key vision within the Industry 5.0 roadmap aimed at meeting the Sustainable Development Goals (SDGs). To realize this vision, researchers are seeking secure solutions based on the integration of blockchain technology into decentralized Industrial Internet of Things (IIoT) systems that can effectively ensure the consistency, integrity, and availability of data in audit functions (Leng et al., 2022). Blockchain is one of these enabling technologies and has been increasingly applied in microgrid systems to help build a more sustainable society (Younes et al., 2013). In this context, audit quality will depend on the accuracy of information provided through blockchain platforms, especially considering the potential for blockchain to be integrated into production processes across various economic sectors, ensuring business sustainability (Singh et al., 2022).

Lastly, the role of blockchain in the exchange of financial and environmental data has wide-ranging applications in the auditing field (Secinaro et al., 2021). For instance, audits may soon be conducted by simply accessing account information, portfolios, and smart contract codes linked to blockchain systems. This shift will necessitate adaptive audit procedures capable of supporting real-time auditing processes (Silva et al., 2022). Furthermore, technology offers

significant opportunities for corporate business applications, especially in strategic business management and control. It also benefits the supply chain sector by enabling cost reduction and environmental sustainability through carbon accounting (Secinaro et al., 2022).

By incorporating blockchain technology, industries can store and exchange data reliably and securely, addressing issues such as interoperability and data protection, thereby fostering trust among participants in the value chain (Leng et al., 2022). In this regard, blockchain-enabled accountability is also emphasized as a key approach to combating air pollution, enabling early alerts for citizens and businesses (Secinaro et al., 2022). Such trust is fundamental to collaborative efforts toward sustainability.

CONCLUSIONS

This study presents an analysis of the scientific literature on blockchain technology and audit quality published in recent years. Although several literature reviews have previously been conducted, this work contributes a bibliometric perspective, allowing for the objective identification of the most influential authors, countries, and keywords, while also mapping the emerging research trends in the field.

Regarding publication volume, the journals with the highest number of articles include IEEE Access, Electronics, IEEE Internet of Things Journal, International Journal of Accounting Information Systems, Journal of Emerging Technologies in Accounting, Information Sciences, Heliyon, and Concurrency and Computation: Practice and Experience. Additionally, the co-citation analysis revealed Susilo Willy, Tiah Huohua, Yang Zhen, and Yu Shui as the most frequently cited authors. In terms of geographic contribution, the United States and China lead in the number of publications related to this topic. These five trends demonstrate that blockchain not only transforms auditing procedures but also improves their quality by integrating technology, ethics, and sustainability, creating a paradigm of assurance and efficiency

The study also identified five key research trends in the literature at the intersection of blockchain and audit quality:

- Security and privacy
- Regulation
- Efficiency and effectiveness
- Knowledge of information technologies
- Sustainability

The literature makes it possible to identify five trends that show that blockchain not only transforms auditing procedures but also improves their quality by integrating technology, ethics, and sustainability, creating a paradigm of assurance and efficiency. Future research on blockchain for smart grids should focus on overcoming scalability issues, improving cybersecurity, optimizing real-time operations, enhancing user identity management, and developing adaptive system designs to maximize the benefits of the technology. Despite the study's rigor, relevance, and comprehensive scope, certain limitations should be acknowledged. Only a few studies have examined the role of blockchain as a stakeholder aggregator in advancing sustainability. The data collection was restricted to a single database (Web of Science) and included only peer-reviewed journal articles written in English. Therefore, future research is encouraged to expand the scope to include other databases such as Scopus or ProQuest for a more complete overview.

Finally, considering that research on blockchain and audit quality remains in a nascent phase, we recommend conducting periodic bibliometric analyses to monitor evolving trends and contribute to the continuous advancement of knowledge in this domain.

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The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

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ETHICS STATEMENT

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Digital technologies and internal control systems in accounts receivable management: evidence from Quitto-corp S.A.

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Abstract

Accounts receivable management is essential for the financial sustainability of companies operating under credit sales systems, as it directly affects liquidity, cash flow, and operational stability. In the context of digital transformation, technological tools and information systems play a key role in strengthening internal control and improving the efficiency of collection processes. The objective of this study was to evaluate the internal control system and the use of technological tools in accounts receivable management at Quitto-Corp S.A. during the 2024 period, to determine their impact on collection efficiency and managerial decision-making. The research followed a mixed-methods approach with a descriptive scope and a non-experimental cross-sectional design. Data were collected through semi-structured interviews and a questionnaire based on the COSO II framework, applied to administrative and commercial personnel involved in credit and collection activities. The results reveal weaknesses in technological support for monitoring accounts receivable, including the absence of integrated systems, delays in accounting records, and reliance on manual procedures. These limitations affect information traceability and interdepartmental communication, contributing to an increase in overdue accounts. The study concludes that implementing integrated information systems and automated monitoring tools can strengthen internal control, reduce credit risk, and improve collection efficiency.

Keywords: Internal control system, accounts receivable management, business intelligence, digital transformation, credit risk management

Introduction

Accounts receivable represents financial assets arising from the sale of goods or the provision of services under deferred payment conditions, whose behaviour directly affects the liquidity and financial stability of companies. An excessive increase in these items may generate a diversion of financial resources, limit cash availability, and increase the risk of uncollectibility, which affects the operational sustainability of the organization (Surikova et al.,2022). Therefore, accounts receivable management is aimed at regulating their volume, structure, and recovery periods through credit policies, systematic monitoring of the portfolio, and control mechanisms that allow evaluation of their recoverability.

The financial literature indicates that the management of working capital components, especially the accounts receivable conversion period, significantly influences corporate financial performance. In this sense, shorter portfolio recovery periods are usually associated with better levels of liquidity and profitability, particularly in adverse economic

contexts where cash availability becomes critical for business operations (Enqvist et al.2014; Deloof,2003). However, accounts receivable is not only a financial component of working capital, but also an instrument of commercial relationship between the company and its customers, since trade credit allows stimulating sales and strengthening business relationships (Singh et al., 2021). Despite these benefits, inadequate management of trade credit may increase credit risk and generate liquidity problems. Credit risk is defined as the possibility that customers fail to comply with their payment obligations, generating financial losses and deterioration in the value of the company's assets (Morales et al., 2023). For this reason, it is essential to establish clear credit policies that regulate the granting of financing, define credit limits, and establish efficient procedures for monitoring and recovering accounts receivable (Pesantes et al., 2023).

Accounts receivables are also regulated by the International Financial Reporting Standards, particularly within the framework of IFRS 9 and IFRS 15, which establish criteria for the recognition, measurement, and impairment of financial assets derived from contracts with customers. However, these standards prioritize the accounting recognition of collection rights, while the strategic evaluation of trade credit and its impact on liquidity mainly depends on business management decisions (Beatty & Liao, 2014; IFRS,2021a; IFRS, 2021b).

In this context, internal control plays a fundamental role in accounts receivable management, since it allows the establishment of mechanisms for supervision, recording, reconciliation, and monitoring of outstanding debts. Several studies indicate that deficiencies in internal control systems are associated with higher levels of delinquency, delays in collections, and distortions in financial information used for decision-making (Patuan & Anitawati, 2023; Huamán , 2022). Likewise, the absence of structured processes to evaluate customers, monitor overdue portfolios, and control accounting records may generate imbalances in cash flow and affect the financial stability of companies.

This study evaluates the internal control system applied to the collection management processes of Quitto-Corp S.A. during the 2024 period to determine its effectiveness in accounts receivable recovery. Using a mixed-methods approach and the COSO framework, the research examines credit granting, accounting recording, and portfolio recovery processes to identify key strengths and weaknesses. The results provide evidence to support recommendations aimed at strengthening internal control, reducing credit risk, and improving the company's financial management. The article is structured as follows: First, the literature review is presented; then, in section three, the methodology is described; next, in section four, the results are presented; and finally, the conclusions are shown.

LITERATURE REVIEW

In recent years, the development of digital technologies and financial information systems has transformed the management of accounts receivable, allowing the automation of credit and collection processes, improving the traceability of operations, and strengthening internal control mechanisms. Tools such as ERP systems, data analytics platforms, and digital financial management solutions facilitate real-time monitoring of the portfolio and contribute to improving the efficiency of administrative processes and the quality of financial information (Romney & Steinbart, 2021; Laudon & Laudon,2022).

In this context, the digitalization of accounting information systems also strengthens internal control mechanisms by improving the traceability of financial transactions and reducing the probability of errors or irregularities in accounting records (Goretzki & Pfister, 2023). The implementation of ERP systems allows the integration of financial, accounting, and

operational information within organizations, facilitating the control of accounts receivable and improving efficiency in working capital management (Al-Okaily et al., 2023). Therefore, accounting information systems play a key role in generating reliable financial information for strategic decision-making related to working capital management (Hall, 2022). Digital transformation in financial processes has made it possible to improve automation, monitoring, and efficiency in accounts receivable management, facilitating payment tracking, evaluation of customers' credit behaviour, and data-driven decision-making (Appelbaum et al.,2017). The use of data analytics and business intelligence tools allows the identification of behavioral patterns among customers, optimization of collection processes, and reduction of delinquency levels within organizations (Richins et al., 2017).

The adoption of digital technologies in accounting and financial processes has generated significant changes in the way companies manage information, allowing greater transparency, operational efficiency, and organizational control capacity (Vial, 2021). Digital tools applied to trade credit management allow the automation of customer evaluation, improvement in payment monitoring, and reduction of risks associated with non-compliance with financial obligations (Gomber et al.,2018). Technological innovation in accounting systems has made it possible to improve efficiency in the management of financial processes, including accounts receivable administration, through the automation and digitalization of records and financial controls (Quattrone, 2022).

This problem is evident in Quitto-Corp S.A., an Ecuadorian company dedicated to the wholesale commercialization of agricultural machinery and equipment, which has presented difficulties in recovering its customer portfolio due to the use of manual procedures, untimely accounting records, and a collection management process based on informal agreements. The absence of formal credit policies, financing limits, and systematic monitoring mechanisms has contributed to the increase in overdue accounts and the deterioration of the organization's cash flow.

Despite advances in the literature on accounts receivable management, working capital, and credit risk, there are still limitations in studies that analyse in an integrated manner the relationship between internal control systems and the use of digital technologies in collection management within commercial companies, especially in emerging economies. Although previous research has examined the impact of trade credit on corporate liquidity and profitability (Deloof, 2003; Enqvist et al., 2014), as well as the importance of accounting information systems and digital technologies in organizational efficiency (Romney & Steinbart, 2021), there is limited empirical evidence analysing how the integration of technological tools and internal control mechanisms contributes to improving accounts receivable management and portfolio recovery in commercial companies in Latin America. In this context, the present study seeks to provide empirical evidence on the effectiveness of the internal control system applied to collection management at Quitto-Corp S.A., considering the role those digital technologies may play in improving credit, recording, and portfolio recovery processes.

In this context, the present research contributes to the literature on financial management and internal control by analysing the relationship between credit and collection processes, the internal control system, and the use of digital technologies in the administration of accounts receivable within a commercial company. Unlike previous studies that have addressed trade credit mainly from the perspective of working capital or financial risk (Enqvist et al., 2014), this study incorporates a comprehensive approach that considers the interaction between operational procedures, internal control mechanisms, and

technological tools used for portfolio monitoring and recovery. In this way, the research provides empirical evidence on how the digitalization of financial processes and the implementation of structured internal controls can contribute to improving efficiency in accounts receivable management, strengthening the reliability of financial information, and reducing credit risk in commercial companies (Bhimani & Willcocks, 2014; Romney & Steinbart, 2021).

METHODOLOGY

The research was developed under a mixed approach, integrating quantitative and qualitative methods to obtain a comprehensive understanding of the internal control system and the use of technological tools in collection management (Molina, 2016). The study was descriptive in nature, with a non-experimental and cross-sectional design, aimed at analysing the real situation of the company during the 2024 period without manipulating the variables under study.

The study population consisted of personnel and stakeholders directly involved in the accounts receivable management process at Quitto-Corp S.A. An intentional non-probabilistic sampling strategy was used to select participants with direct knowledge and experience in credit approval, sales, accounting, and collection activities. The final sample included 20 participants, comprising administrative personnel, commercial staff, and clients associated with credit operations. Participants were selected based on their active involvement in accounts receivable processes and their ability to provide relevant information regarding internal control practices, credit management procedures, and the use of technological tools. This approach ensured the inclusion of key informants capable of providing a comprehensive perspective on the effectiveness of the company's internal control system and collection management practices. The composition of the sample is presented in Table 1.

Table 1 - *Distribution of participants included in the study*

Participant Group	Number of Participants	Percentage (%)
Administrative staff	6	30.0
Commercial staff	8	40.0
Clients	6	30.0
Total	20	100.0

As a reference framework for evaluating the internal control system, the COSO II model (COSO, 2017) was used, which allows the analysis of organizational processes considering components such as control environment, objective setting, control activities, information and communication, and monitoring (Do Prado et al, 2019; Chalmers et al., 2019). For data collection, the following techniques were used: - Semi-structured interviews, directed at personnel responsible for credit and accounting management, - Questionnaires based on the components of the COSO II model (COSO, 2017), applied to evaluate the level of internal control and the use of technological tools in collection processes. The analysis of the information combined descriptive statistical techniques for quantitative data and interpretative analysis for qualitative information obtained through interviews.

RESULTS AND DISCUSSION

Quitto-Corp S.A. presents structural weaknesses in the organization of its administrative processes, mainly due to the absence of a formal organizational chart and the empirical

assignment of roles and responsibilities. Although four hierarchical levels can be identified in practice—directive, advisory, support, and operational—these operate informally and without clearly defined competencies. This situation limits the proper allocation of responsibilities, hinders effective supervision, and weakens internal control, particularly in credit, sales, and collection activities.

Likewise, the credit, sales, and collection processes are not formally documented. Their identification was therefore based on staff interviews and direct observation of operational activities. The results show that these procedures are carried out informally, relying mainly on personnel experience and verbal communication, without clearly established policies regarding credit terms, financing limits, timely records, or control points.

This lack of process standardization increases operational risk, generating delays in transaction recording, weak monitoring of the customer portfolio, and a greater likelihood of errors and overdue balances. In addition, the limited use of technological tools for financial information management reduces operational traceability and weakens control over credit approval and accounts receivable recovery activities (Romney & Steinbart , 2021).

The evaluation of the internal control system applied to the accounts receivable process reveals significant deficiencies in several of its components (Table 2), which affect credit management and portfolio recovery. The analysis was developed considering the principles of the COSO internal control framework, widely used to evaluate the effectiveness of organizational control systems (COSO, 2017).

Table 2 - *Weighted results of the application of the internal control instrument to accounts receivable*

Components	%	Risk Level
Control environment	46	High
Objective setting	19	High
Risk assessment	55	Moderate
Control activities	43	High
Information and communication	66	Moderate
Monitoring	35	High

Note: The percentages correspond to the average obtained per component of the internal control system; the high–moderate risk levels are assigned according to the criteria of the instrument used for the assessment.

The evaluation of the internal control system reveals significant weaknesses across several COSO II components. The control environment is limited by the absence of formal guidelines, job manuals, and clearly defined internal policies. In addition, the lack of a formal organizational structure and periodic training programs weakens the organizational control culture and operational discipline in credit and collection processes. Likewise, objectives related to accounts receivable management are not formally established or linked to performance indicators—such as recovery periods, acceptable delinquency levels, or reductions in overdue balances—hindering performance evaluation and strategic decision-making.

Regarding control activities, deficiencies arise from the absence of standardized procedures for credit approval, financing limits, monitoring of overdue balances, and timely transaction recording. Existing controls are applied reactively and rely mainly on personnel experience rather than formal mechanisms such as documented authorizations or prior verifications. The information and communication component also presents limitations due to the lack of integration among the sales, accounting, and collections departments, which delays the flow of information related to balances, payments, and due dates. Finally, the monitoring

component is weak because the organization lacks continuous supervision mechanisms and periodic evaluations of portfolio aging, compliance with credit policies, and the effectiveness of collection actions. This situation limits early detection of deviations and delays the implementation of corrective measures.

The analysis of the credit granting process (Table 3) reveals structural weaknesses derived from the absence of formal policies, standardized procedures, and technical criteria for the evaluation and approval of clients. This situation limits the company's capacity to adequately identify credit risk and affects the quality of the accounts receivable portfolio.

Table 3 - Clients who meet the formal requirements prior to credit approval

Type of requirement	Comply
Basic Services	0
Credit Bureau Review	1
Copy of ID Card	2
Copy of RUC	5
Personal References	15

Note: Finding in the credit granting process

The results indicate that the company grants credit without applying technical methodologies to evaluate applicants' payment capacity, credit history, level of indebtedness, or financial behaviour. In most cases, credit approval relies on personnel experience or subjective criteria, increasing the risk of financing clients with low solvency. Systematic credit risk assessment is essential for ensuring financial sustainability, as it enables the identification of potentially delinquent clients and the establishment of credit conditions according to their payment capacity. The absence of these mechanisms may increase overdue accounts and negatively affect corporate liquidity.

Likewise, it was identified that credit files are incomplete and lack the minimum documentation necessary to support credit evaluation, such as proof of address, commercial references, income verification, or inquiries to credit bureaus. This situation weakens the financial analysis process of the client and reduces the capacity of the company to make well-founded decisions. Another relevant aspect is the absence of credit limits and differentiated payment terms according to the risk profile of clients. The establishment of clear credit policies and customer segmentation criteria allows the reduction of financial uncertainty and improves working capital management.

Additionally, a limited integration between the sales, credit, and accounting areas is observed, which makes the timely exchange of information about customer payment behaviour difficult. Various studies highlight that enterprise information systems and digital financial management platforms allow the centralization of customer information and improve the control of the credit granting process (Romney & Steinbart, 2021). Because of these deficiencies, the company presents a progressive increase in overdue accounts, greater difficulties in the recovery of accounts receivable, and a direct impact on its liquidity. The lack of a structured credit granting process limits the administration's capacity to adequately manage financial risk and compromises the operational efficiency of the organization.

The analysis of the sales process reveals significant weaknesses related to the absence of formal controls before and after the execution of commercial transactions, especially those carried out under the credit modality. These deficiencies directly affect the efficiency of the internal control system and increase the financial risk associated with accounts receivable

management. Eleven clients were observed with specific limits on amount and term that were not met when issuing invoices.

The company does not have standardized procedures that require verification of the customer's account status, compliance with previous obligations, or adherence to credit limits before authorizing new commercial operations. In practice, sales decisions are mainly based on operational and commercial criteria, without the application of technical evaluations that allow the analysis of customers' credit risk.

Furthermore, the sales process is not adequately integrated with the credit, collections, and accounting departments, leading to deficiencies in organizational communication and delays in the recording of commercial transactions. This lack of coordination hinders comprehensive control of accounts receivable and reduces the reliability of financial information used for managerial decision-making. In several cases, customers with overdue balances continue purchasing on credit without settling prior obligations, reflecting the absence of validation mechanisms that restrict new credit sales when delinquency exceeds acceptable limits. Studies indicate that integrated information systems, such as ERP or CRM platforms, improve the control of commercial operations through automated alerts and real-time risk validation (Laudon & Laudon, 2022).

Additionally, delays in the accounting recording of sales affect the reliability of financial information and limit effective monitoring of the customer portfolio, hindering the implementation of efficient collection strategies. In this context, the digitalization of accounting and commercial processes is essential to improve operational traceability and strengthen internal control mechanisms (Bhimani & Willcocks, 2014). As a result, the company experiences higher delinquency levels, delays in revenue recovery, and reduced control over accounts receivable. The absence of structured controls weakens the internal control system, limits decision-making based on reliable information, and negatively affects the organization's liquidity and financial sustainability.

The analysis of the collection process reveals significant weaknesses associated with the absence of formal procedures and the limited use of technological tools for portfolio management. Currently, credit recovery activities are mainly carried out through verbal communication with customers and manual monitoring of outstanding balances, which reduces the efficiency of the collection process. Table 4 shows the amounts of overdue portfolios with significant balances in the periods from 2022 to 2024.

Table 4 - *Historical overdue portfolio between the periods 2022–2024*

Period	2022	2023	2024
Not yet due	–	–	–
Overdue 30 days	18,157.20	13,642.93	20,850.46
Overdue 60 days	39,227.03	23,320.95	40,935.20
Overdue 90 days	7,202.73	11,557.38	23,599.52
Overdue 120 days	–	13,865.63	16,073.74
Overdue more than 120 days	–	22,567.40	38,373.23

Note: Finding in the collection process

Specialized literature highlights that the automation of collection processes through digital systems allows improvement in portfolio control, reduction of recovery times, and strengthening of credit risk management (O'Brien & Marakas, 2019). In particular, the use of technological platforms for monitoring accounts receivable facilitates the generation of automatic maturity alerts, the classification of customers according to their payment

behaviour, and the implementation of differentiated collection strategies. In the analysed case, 93.2% of the portfolio corresponds to natural persons, while only 6.8% corresponds to legal entities, which shows a high concentration in individual clients whose payment capacity tends to be more volatile. This portfolio structure increases financial risk, especially in the absence of technical criteria for credit evaluation. Likewise, it is observed that only 50.9% of accounts receivable are supported by electronic invoices, while the remaining 49.1% are supported by pro forma invoices or quotations, documents that have lower legal and accounting support. This situation weakens the enforceability of the credit and may affect the proper recognition of income in accordance with IFRS 15 regarding revenue from contracts with customers (IFRS, 2021a, IFRS, 2021b).

Between 2022 and 2024, the company shows a sustained increase in accounts receivable, particularly in the overdue portfolio, indicating that a significant portion of credit sales is not converted into cash on time. This situation reflects weaknesses in credit, sales, and collection processes and a limited capacity for portfolio recovery.

From a liquidity perspective, the company reports a current ratio of 0.82, meaning it holds only USD 0.82 in current assets for every dollar of short-term liabilities. This value is below the recommended level of 1 and indicates insufficient liquidity to meet immediate obligations, largely due to the high volume of slowly recovered accounts receivable. In terms of efficiency, the accounts receivable turnover is 2.05 times per year, equivalent to an average collection period of approximately 178 days, which significantly exceeds the typical commercial credit range of 30–60 days. This confirms deficiencies in portfolio monitoring and control mechanisms.

Additionally, the company has not established provisions for uncollectible accounts despite the growth of overdue balances, which may overstate current assets and affect the reliability of financial statements according to International Financial Reporting Standards customers (IFRS, 2021a, IFRS, 2021b). Consequently, the organization faces cash flow constraints, greater short-term financial pressure, and increased financial risk.

The results indicate that Quitto-Corp S.A. faces limitations in collection management due to the lack of integrated technological tools and weaknesses in its internal control system. This finding is consistent with Chalmers et al. (2019), which states that effective internal control in modern organizations increasingly depends on the integration of information systems that enable process automation, operational traceability, and improved financial supervision.

To better illustrate the gaps identified during the evaluation of the internal control system and collection management processes, Table 5 compares the current operational conditions observed at Quitto-Corp S.A. with the desired state based on best practices in internal control, digital transformation, and accounts receivable management. The comparison highlights the need for greater technological integration, process standardization, and real-time information management to improve collection efficiency and reduce credit risk.

In this regard, the digitalization of accounting and financial processes through Enterprise Resource Planning (ERP) systems has become a key strategy for improving accounts receivable management. ERP platforms integrate sales, accounting, inventory, and portfolio information, facilitating transaction monitoring, automated records, and real-time financial reporting, thereby reducing operational errors and improving collection efficiency (Romney & Steinbart, 2021).

Table 5 - *Comparison of Current and Desired States of Accounts Receivable Management Processes*

Process	Current State	Desired State
Accounts Receivable Monitoring	Portfolio monitoring is performed manually through spreadsheets and verbal follow-up, with limited visibility of overdue balances and payment behavior	Automated monitoring through ERP or CRM systems with real-time dashboards, aging analysis, and automatic alerts for overdue accounts
Accounting Records	Delays in transaction recording and partial use of electronic invoices reduce the reliability and timeliness of financial information	Real-time recording of transactions through integrated information systems, ensuring accurate and up-to-date financial information
Information and Communication	Limited integration between sales, accounting, and collections departments, resulting in delays in information sharing and decision-making	Integrated communication through centralized digital platforms that facilitate immediate access to customer, sales, and collection information
Credit Approval Process	Credit decisions are based primarily on experience and subjective criteria, with limited documentation and risk analysis	Standardized credit evaluation procedures supported by customer risk assessments, credit bureau verification, and defined credit limits
Collection Management	Collection activities rely mainly on manual follow-up and informal communication with customers	Automated collection workflows, payment reminders, customer segmentation, and differentiated recovery strategies
Internal Control and Monitoring	Absence of periodic performance evaluations and limited supervision of collection indicators	Continuous monitoring through key performance indicators (KPIs), automated reports, and periodic internal control assessments
Technology Utilization	Lack of integrated technological tools to support credit and collection management	Implementation of ERP, CRM, Business Intelligence, and data analytics tools to strengthen decision-making and operational efficiency

Note: The desired state reflects best practices identified in the literature regarding digital transformation, internal control systems, and accounts receivable management (Romney & Steinbart, 2021; Laudon & Laudon, 2022; Sharda et al., 2020).

Similarly, Business Intelligence (BI) tools support predictive analysis of payment behaviour and credit risk by processing large volumes of financial data and generating indicators for managerial decision-making. These systems enable the identification of delinquency patterns, customer segmentation by risk profile, and prioritization of collection actions (Sharda et al., 2020). Customer Relationship Management (CRM) systems also contribute to portfolio management by centralizing commercial and financial information, monitoring customer interactions, and automating communications, which improves collection processes and strengthens customer relationships (Buttle & Maklan, 2019).

Recent advances in artificial intelligence and machine learning further enhance credit risk management by enabling the prediction of payment defaults based on financial variables, historical sales behaviour, and transaction patterns (Ugando et al., 2024; Zhou et al., 2021; Lessmann et al., 2015). These technologies facilitate early risk detection and more effective recovery strategies. However, their implementation must be supported by a strengthened internal control system. According to the COSO II framework, the appropriate use of information technologies improves information, communication, and monitoring processes,

enabling timely risk identification and more efficient corrective actions (Orlova, 2020; Clarke et al.,2020).

CONCLUSIONS

The results of the study show that collection management at Quitto-Corp S.A. is carried out mainly through traditional administrative procedures and with a low level of technological integration, which limits the efficiency of the internal control system applied to accounts receivable.

The absence of digital tools for portfolio monitoring, as well as the lack of integrated financial information systems, makes the traceability of operations difficult and reduces the capacity for supervision over credit and portfolio recovery processes.

In this context, the incorporation of digital financial management technologies, such as ERP systems, customer relationship management platforms (CRM), data analysis tools, and automated portfolio monitoring mechanisms, can significantly contribute to improving operational efficiency and strengthening internal controls. Various studies have shown that the digitalization of financial processes improves the quality of information, optimizes managerial decision-making, and reduces credit risk.

This study has certain limitations that should be considered when interpreting the findings. First, the research was conducted as a single-case study in Quitto-Corp S.A., which may limit the generalizability of the results to other organizations or sectors. Second, the cross-sectional design provides evidence of the situation during the 2024 period but does not allow the assessment of changes over time or the long-term effects of technological adoption.

Future research could address these limitations by conducting comparative studies across companies from different industries or regions to identify common patterns and best practices in accounts receivable management. Additionally, action-research approaches could be developed to evaluate the implementation of Enterprise Resource Planning (ERP) systems, Customer Relationship Management (CRM) platforms, or Business Intelligence tools, measuring their impact on internal control effectiveness, collection efficiency, and organizational performance over time.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

Data supporting the findings of this study are available upon reasonable request.

ETHICS STATEMENT

This study involved human participants through questionnaires and semi-structured interviews. Participation was voluntary, and informed consent was obtained from all participants prior to data collection. The information collected was treated confidentially and used exclusively for research purposes.

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From Classroom to Enterprise: AI Adoption and Digital Education

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Abstract

The European Union's 2030 target of 75% enterprise AI adoption faces a structural paradox: adoption rates remain well below the trajectory, yet citizen surveys reveal broad awareness of the need for digital transformation. This paper argues that the adoption gap cannot be adequately explained by firm-level factors alone. Its objective is to determine the extent to which educational pipeline conditions constrain enterprise AI adoption in the EU and to extend the Technology-Organization-Environment (TOE) framework accordingly. Drawing on the TOE framework and integrating evidence from DESI 2025, the State of the Digital Decade 2025 report, and Flash Eurobarometer 564 on Future Needs in Digital Education (May 2025), we map a systemic constraint linking the educational pipeline to organizational AI capacity and environmental policy effectiveness. Using Portugal as an illustrative case, the analysis shows that a high degree of citizen-level awareness and institutional willingness to embrace AI in education coexist with material infrastructure deficits, gaps in teacher preparation, and low AI literacy in the adult workforce. These findings enrich the TOE framework by surfacing the educational-pipeline dimension as a structurally prior condition for enterprise AI adoption. Policy implications are drawn for the EU's Digital Decade agenda and for member states seeking to accelerate AI take-up among enterprises and SMEs. The paper contributes to TOE-based AI adoption research by linking organizational readiness to upstream education and skills formation processes.

Keywords: AI adoption, Digital Education, TOE framework, Digital Decade, Digital Skills, AI literacy, SMEs.

Introduction

European Union-wide adoption of Enterprise AI is growing, but not fast enough. The share of EU enterprises using AI rose from 8.1% to 13.5% between 2023 and 2024, a 67% year-on-year increase, reflecting genuine momentum (European Commission, 2025a). Yet the European Commission's own projections indicate that the Digital Decade target of 75% adoption by 2030 will not be met; under current trajectories, the target is estimated at 35.9% (European Commission, 2025a). The gap is structural, not cyclical, and requires structural analysis.

Most research on enterprise technology adoption focuses on firm-level determinants: managerial readiness, available capital, internal skills, and competitive pressure. The TOE framework of Tornatzky and Fleischer (1990) has become the standard scaffold for organizing these factors into three contextual dimensions: technological, organizational, and environmental. Applied to AI adoption, this framework has proven analytically productive, identifying skills shortages, infrastructure deficits, and regulatory complexity as the most binding constraints (Tiago & Almeida, 2026). However, the AI skills available or unavailable in enterprises today are largely a product of educational systems and labor market dynamics that have played out over the past decade. The AI literacy of future workers, and hence the future organizational capacity for adoption, is being shaped right now in schools and

universities. If that pipeline is inadequate, no amount of short-term enterprise support will sustainably close the adoption gap.

This paper integrates two complementary sources of evidence to make this argument concrete. The DESI 2025 and State of the Digital Decade 2025 reports provide the standard performance data on AI adoption trajectories, infrastructure, and skills. Flash Eurobarometer 564 (May 2025), which specifically focused on future needs in digital education, provides citizen-level perception data from 25,781 respondents across 27 EU member states on the role of digital skills and AI in education, perceived barriers, and desired policy responses. Portugal illustrates a clear tension: despite strong public and institutional support for AI, adoption remains low at 8.6% of firms, below the EU average of 13.5%, reflecting structural barriers that hinder its implementation. The argument addresses two limitations in current debates: the tendency to treat AI adoption primarily as a firm-level problem, and the assumption that European regulatory ambition and funding availability will automatically translate into adoption capacity across sectors and regions.

Against this background, the study addresses the following research question: to what extent do conditions in the educational pipeline constrain enterprise AI adoption in the EU, and how can the TOE framework be extended to capture this upstream constraint? Three objectives guide the analysis: (i) to extend the TOE framework by conceptualizing the educational pipeline as a structurally prior condition of the organizational context; (ii) to map indicators from the State of the Digital Decade 2025 reporting and Flash Eurobarometer 564 onto the three TOE dimensions; and (iii) to examine Portugal as an illustrative case of the gap between citizen-level digital awareness and enterprise-level adoption capacity.

The paper proceeds as follows: Section 2 develops the theoretical background and the proposed extension; Section 3 presents the data and methods; Section 4 reports the analysis across the three TOE dimensions and develops the Portuguese case; Section 5 concludes with policy and research implications.

Theoretical Background

The TOE Framework and Its Application to AI Adoption

Tornatzky and Fleischer (1990) proposed the TOE framework to explain why organizations adopt new technologies at different rates and identified three contextual clusters. The technological context covers internal and external technologies, including their relative advantage, compatibility, and complexity. The organizational context refers to firm characteristics such as size, structure, resources, and human capital. The environmental context includes external conditions, notably industry dynamics, regulation, competition, and access to public support and knowledge infrastructure. The TOE framework has been widely applied in information systems research and increasingly adapted to analyze AI adoption (Tiago & Almeida, 2026). Tursunbayeva and Ben Gal (2024) identify top management support and technological readiness as the most consistent predictors of AI adoption in organizations. Fosso Wamba et al. (2024) emphasizes the growing importance of the environmental context in the post-GDPR EU, where regulatory compliance creates both barriers and potential drivers of AI adoption. Awa et al. (2015) and Oliveira and Martins (2010) confirm the framework's stability across contexts, from e-commerce to cloud computing. A persistent limitation in applying TOE to AI adoption is the treatment of human capital as a static organizational endowment (Tiago & Almeida, 2026). Studies typically measure current skill availability and identify shortages as present-tense constraints. Less attention has been paid to the mechanisms by which the human capital stock is replenished and upgraded over time. This matters because the skills bottleneck identified in virtually

every study of enterprise AI adoption is not primarily a product of managerial choices; it reflects the output of educational systems operating with a significant time lag. Addressing today's skills deficit requires acting on educational pipelines that will produce their output in three to ten years.

The Educational Pipeline as a Structurally Prior TOE Condition

We propose an extension of the standard TOE framework that treats the educational pipeline as a structurally prior condition for the organizational dimension. This is not a new dimension but a temporal deepening of the existing framework: the organizational context at any point in time reflects the accumulated output of the educational context over the preceding period, mediated by labor market dynamics and lifelong learning investments. This extension draws on the broader innovation systems literature, particularly the concept of sectoral innovation systems (Malerba, 2002) in which human capital formation through education is identified as a foundational condition for sectoral technological capability. It also resonates with Brynjolfsson and McAfee's (2017) observation that the organizational challenges of AI adoption are fundamentally about complementary human capital rather than technology per se. Firms struggle not with accessing AI tools but with deploying them effectively alongside skilled human judgment (Tiago & Almeida, 2026). The proposed extension is nonetheless distinct from both antecedents. Malerba (2002) treats education as a component of sectoral innovation systems but does not specify how educational output enters firm-level adoption decisions, nor the temporal lag between schooling investments and organizational capability. Brynjolfsson and McAfee (2017) locate the complementary human capital problem inside the firm, leaving its upstream formation exogenous. The contribution here is to internalize this upstream process within the TOE logic: the educational pipeline becomes a temporally prior determinant of the organizational context, observable through citizen-level perception data and actionable through education policy, a combination absent from either antecedent.

The educational pipeline dimension manifests in three analytically distinct ways within the TOE framework. First, it shapes the current organizational context through the stock of digitally skilled workers available in the labor market. Second, it conditions the future organizational context by developing AI literacy and digital competencies among current students who will join the workforce during the Digital Decade. Third, it interacts with the environmental context: the adequacy of educational systems reflects political choices about curriculum, teacher training, equipment, and funding, all within the domain of environmental policy intervention.

AI Literacy as a Bridging Concept

A key concept linking the educational pipeline to enterprise AI adoption is AI literacy, defined by Long and Magerko (2020) as a set of competencies that enable individuals to critically evaluate, communicate about, and collaborate with AI systems. AI literacy is broader than technical AI skills, encompassing conceptual understanding of how AI works, critical awareness of its limitations and risks, and the practical ability to use AI tools responsibly. The relevance of AI literacy to enterprise adoption is threefold. First, it determines the workforce's absorptive capacity to integrate AI tools into work processes, a prerequisite for productive adoption rather than mere nominal use. Second, it shapes managerial ability to evaluate AI investments, reducing the uncertainty premium that inhibits adoption decisions in the face of unfamiliar technology. Third, it conditions the quality of governance in AI deployment, particularly important in the context of the EU AI Act's requirements for human oversight of high-risk applications. Dai and Ke (2022) and Ng et al. (2021) argue that AI literacy should be conceptualized as a foundational competency comparable to reading and

numeracy, thereby justifying its integration into formal educational curricula from an early age.

METHODOLOGY AND DATA SOURCES

This study adopts a multi-source secondary data analysis approach. The primary sources are three official documents: the State of the Digital Decade 2025 report and its annexes (COM(2025) 290 final), specifically Annex 1 (horizontal analysis) (European Commission, 2025a) and Annex 23 (Portugal country report) (European Commission, 2025b), published June 2025; and the Flash Eurobarometer 564 on Future Needs in Digital Education (European Commission, 2025c), a survey of 25,781 EU citizens aged 15 and above conducted between 7 and 14 May 2025, with approximately 1,000 respondents per country and a representative sample for Luxembourg, Cyprus, and Malta of approximately 500. A multi-source secondary design was preferred over primary data collection for three reasons: the research question concerns system-level relationships best captured through harmonized official statistics covering all member states; the two evidence streams are contemporaneous, both published in mid-2025, allowing a temporally coherent reading; and combining performance indicators with citizen perception data permits triangulation between institutional delivery and social demand, which neither source supports alone. The analytical procedure combines descriptive comparison and structured interpretive analysis, operationalized in four steps: (1) indicators were extracted from each source and assigned to one of the three TOE dimensions, with educational-pipeline indicators tagged as antecedents of the organizational context; (2) Portugal's values were benchmarked against EU27 averages and, where applicable, the 2030 Digital Decade targets; (3) divergence was quantified as the percentage-point difference between Portugal and the EU27 average (Δ in Tables 2 and 3), since the publicly released Eurobarometer data consist of aggregate proportions rather than respondent-level microdata, which precludes item-level means and standard deviations; and (4) the resulting patterns were interpreted against the extended TOE framework developed in Section 2 to assess whether the educational pipeline behaves as a structurally prior condition.

Several limitations should be acknowledged. The DESI data aggregates national-level indicators, preventing disaggregation by firm size, sector, or region. The Eurobarometer data capture citizens' perceptions rather than behaviors, and the survey instrument focuses specifically on education rather than enterprise AI adoption. Causal inference from secondary data is not possible; the analysis is configurational and interpretive.

RESULTS

TECHNOLOGICAL CONTEXT: INFRASTRUCTURE STRENGTHS AND AI-SPECIFIC DEFICITS

The EU's connectivity baseline is solid, with VHCN coverage at 82.5%, fiber at 69.2%, and 5G at 94.3% in 2024. Portugal exceeds all three metrics. However, connectivity alone does not sustain AI workloads. Europe's installed data center capacity of 8–10 GW represents roughly one-third of US capacity. This structural dependency on non-European cloud providers carries implications for both cost and data sovereignty. Edge computing offers a partial counterweight: 2,257 nodes in 2024, growing at 90% annually toward a 2030 target of 10,000, but deployment is concentrated in four large member states, leaving Portugal with only 27 nodes. The Eurobarometer 564 data extend the technological deficit into the educational pipeline: 58% of Portuguese respondents identify inadequate school equipment as the primary barrier to young people's digital skills development, the highest share in the EU27 and well above the EU27 average of 47%. These are not separate problems. A workforce

entering the labor market without foundational digital exposure imposes a ceiling on enterprise AI adoption capacity that infrastructure investment alone cannot lift.

Table 1 - *Portugal's Digital Decade KPIs vs. EU Averages and 2030 Targets (2024)*

Indicator	Portugal 2024	EU Average 2024	EU 2030 Target
AI adoption by enterprises	8.6%	13.5%	75%
SMEs with basic digital intensity	74.3%	72.9%	90%
ICT specialists (% employment)	5.2%	5.0%	~10%
At least basic digital skills (adults)	56.0%*	55.6%*	80%
Digital public services (citizens)	84.5/100	82.3/100	100/100
Access to e-health records	88.1/100	82.7/100	100/100
Fixed VHCN coverage	94.6%	82.5%	100%
Overall 5G coverage	98.7%	94.3%	100%
Unicorns	1	286	500

Source: European Commission, DESI 2025 (European Commission, 2025a, 2025b).

Organizational Context: Skills, AI Literacy, and the Generational Lag

Enterprise AI adoption in the EU stood at 13.5% in 2024 against a 2030 target of 75%, with a 29-point gap between large enterprises (41.2%) and SMEs (12.6%). Skills are the binding constraint: only 55.6% of EU adults hold basic digital skills against an 80% target, and the ICT specialist workforce is on track to reach barely 12.4 million by 2030, less than two-thirds of the 20 million target. Portugal tracks close to the EU average on basic digital skills (56%) but sets its own ICT specialist target at 7%, well below the EU benchmark, suggesting constrained ambition. The forward-looking dimension is where the Eurobarometer 564 data are most consequential. In Portugal, 74% of citizens agree that AI literacy will be universally necessary by 2030 (EU27: 63%), 97% support teaching digital skills to all in schools and universities, and 87% expect all teachers to hold AI competencies, including generative AI. The gap between this awareness and current institutional delivery is not a paradox of ignorance but one of implementation.

Table 2 - *Citizen Perceptions on Digital Skills and AI in Education: Portugal vs. EU27*

Survey item (agree / strongly agree)	Portugal	EU27	Δ (p.p.)
Digital skills essential in education (Q1_1)	93%	85%	+8
Digital skills essential for career success (Q1_2)	87%	80%	+7
Digital skills training is important for the national economy(Q1_3)	93%	86%	+7
Digital skills needed to use generative AI responsibly (Q1_6)	91%	85%	+6
AI can improve teaching; educators should not fear trying (Q6)	25%	17%	+8
AI has no place in the classroom (Q6)	16%	22%	−6
AI literacy will be universally necessary by 2030 (Q8)	74%	63%	+11
Schools should teach digital skills to all (Q3_1)	97%	92%	+5
Teachers should have AI competencies, incl. generative AI (Q9_5)	87%	81%	+6
Schools need more support for cybersecurity and privacy (Q9_3)	94%	88%	+6
The EU should develop standards for digital technology in education (Q12)	60%	49%	+11

Source: Flash Eurobarometer 564 (European Commission, 2025c).

Environmental Context: Policy Ambition, Regulatory Complexity, and Educational Governance

The environmental dimension combines competitive pressures driving AI adoption with public policy conditions. In the EU, three factors stand out. First, regulation is ambivalent. Instruments such as the EU AI Act and the General Data Protection Regulation support trustworthy AI and can be a competitive advantage, but they impose heavier compliance costs on SMEs and less-prepared member states. Ongoing simplification efforts, including

the planned Digital Omnibus, reflect this tension. Second, public investment is substantial. Between 2020 and 2027, around €207 billion will be allocated to support digital objectives, largely through the Recovery and Resilience Facility. Portugal allocates 21% of its RRF and €2.4 billion from the cohesion policy, alongside initiatives such as GenAI4EU and InvestAI. Third, education policy reveals a strong demand for EU-level coordination. Data from Eurobarometer 564 show that Portuguese respondents prioritize European standards for digital education and the provision of improved digital skills above the EU average. There is also above-average support for common EU AI rules in education and for education-specific AI tools. A critical issue concerns teacher preparedness. While only 32% of Portuguese respondents identify it as a barrier, 92% believe teachers should guide the safe use of technology, and 87% expect AI-specific competencies. This gap highlights a significant implementation challenge in aligning expectations with actual readiness. These figures suggest that citizens in lower-capacity member states actively welcome a more assertive EU role precisely because national institutional delivery has not kept pace with social expectations.

Table 3 - *Perceived Barriers to Digital Skills Development in Youth: Portugal vs. EU27 (Flash EB 564, Q2)*

Barrier to digital skills development in young people (Q2)	Portugal	EU27	Δ (p.p.)
Schools are inadequately equipped (devices, connectivity)	58%	47%	+11
Families cannot afford the necessary equipment	47%	37%	+10
Teachers not adequately prepared	32%	41%	−9
Parents lack the knowledge to support learning at home	43%	38%	+5
Curricula do not give enough attention to digital skills	35%	35%	0
Students are not motivated to learn digital skills	9%	13%	−4

Source*:* European Commission, 2025c. Multiple-response questions.

PORTUGAL AS AN ILLUSTRATIVE CASE

Portugal's profile within the extended TOE framework is analytically instructive: strong social awareness of the need for AI literacy, solid connectivity infrastructure, and significant public investment commitments coexist with persistently below-average enterprise AI adoption. This is a structural lag between aspiration and institutional delivery, not a deficit of engagement.

The connectivity base is genuinely strong, with FTTP coverage at 93.2% and 5G at 98.7%, complemented by the National Digital Strategy, participation in EuroHPC, and access to the Spain-led AI Factory consortium. Attitudinally, Portugal scores at or above EU27 averages on every positive indicator in the Eurobarometer (Table 2). The paradox lies in school infrastructure. The 58% of Portuguese respondents identifying inadequate school equipment as the primary barrier to young people's digital development, the highest share in the EU, stands in stark contrast to household connectivity figures. Residential networks reflect private investment; school equipment depends on public budget allocations that have lagged. A student entering the labor market in 2026 or 2027 with a digital skills deficit acquired in an under-equipped classroom creates a structural ceiling on enterprise AI adoption capacity that no short-term incentive program can lift.

The teacher preparation dimension compounds this. While Portuguese respondents express high expectations of teachers regarding AI competency and their role in safe technology use, the Commission's country report notes that advanced digital skills are not prominent in Portugal's national roadmap, and the roadmap's measures specifically targeting AI are limited. This creates a tension between citizen expectations and policy delivery that requires urgent attention.

The enterprise adoption environment in Portugal faces a particular constraint in the absence of a functioning scale-up ecosystem. Portugal hosts only one unicorn and plans to grow its startup count from approximately 4,700 to 6,000 by 2030. This matters for AI adoption because AI-native startups function as demonstration platforms and talent attractors; their absence reduces the density of adoption role models and the competitive pressure on incumbent firms to adopt.

The Eurobarometer data add a sovereignty dimension: 27% of Portuguese respondents favor EU support for developing European educational technologies (EU27: 23%), signaling awareness that dependence on non-European edtech platforms for AI-assisted learning raises concerns analogous to those identified in the enterprise cloud context. Despite these constraints, Portugal's trajectory contains genuine positive signals. The 13% annual growth in ICT specialists (EU average: 4.2%) is encouraging and reflects measurable progress in gender representation. The 2024 national roadmap revision, addressing 77% of the Commission's recommendations, reflects institutional responsiveness. The e-health records access score of 88.1, projected to reach the 2030 target by 2027, demonstrates that where investment is targeted and sustained, Portugal can move quickly.

Discussion and Conclusions

Returning to the research question, the evidence supports an affirmative answer: educational pipeline conditions do constrain enterprise AI adoption in the EU, a constraint visible in the coexistence of high citizen awareness, documented school infrastructure and teacher-preparation deficits, and persistently below-target adoption rates. The three objectives were met: the TOE framework was extended by specifying the educational pipeline as a structurally prior condition of the organizational context (Section 2); indicators from both sources were mapped onto the three TOE dimensions, with Portugal-EU27 divergence quantified in percentage points (Tables 1 to 3); and Portugal was examined as an illustrative case in which strong social demand for digital education coexists with weak institutional delivery.

The contribution of this paper is to reframe enterprise AI adoption as a temporally embedded process whose organizational conditions are partly produced outside the firm, through education systems, labor market formation, and public policy. By extending the TOE framework in this direction, the paper shows that AI adoption cannot be understood only through current measures of firm readiness. The educational pipeline is a structural determinant of future enterprise absorptive capacity. Despite its analytical usefulness, the TOE framework tends to classify determinants of adoption into relatively stable categories, understating the temporal and cumulative nature of AI capabilities, and it is not always sufficiently sensitive to sectoral and territorial asymmetries. These limitations justify the proposed extension, which deepens TOE by treating the educational pipeline as a prior condition shaping organizational readiness over time.

The practical implication is that AI adoption policies must connect industrial, educational, and regional development strategies. Investment in school equipment, teacher AI literacy, lifelong learning, SME advisory capacity, and regional innovation ecosystems should be treated as part of the same agenda. In Portugal, strong social support for digital education will only translate into enterprise AI adoption if accompanied by sustained investment, sector-specific support, and territorially sensitive implementation. Regional inequalities also matter; national averages may hide major differences between metropolitan areas, interior territories, and island or outermost regions such as the Azores and Madeira, concerning not only connectivity but also access to specialized teachers, advanced training, innovation

intermediaries, and technology-intensive work environments. AI adoption policy therefore requires territorially differentiated instruments, not only generic national or SME measures. Moreover, the European institutional approach to AI adoption is ambivalent: its emphasis on trust, rights, data protection, and strategic autonomy may become a competitive advantage (Draghi, 2024). Thus, it also risks creating a gap between regulatory ambition and implementation capacity, especially for SMEs, peripheral regions, and member states with weaker innovation ecosystems. The issue is not whether Europe regulates too much, but whether its institutional architecture is sufficiently operational, accessible, and territorially sensitive to support actual adoption.

AI adoption varies substantially across sectors. Data-intensive sectors, such as finance, health, advanced manufacturing, and public services, may adopt AI earlier because they have clearer use cases, stronger data infrastructures, and greater regulatory or productivity incentives, whereas sectors dominated by SMEs, low margins, seasonal activity, or fragmented data systems may face deeper organizational barriers, requiring a sector-sensitive reading of TOE.

Future research should test this extended TOE framework through primary empirical studies. Longitudinal research could examine how digital education outcomes influence enterprise adoption over time. Sectoral studies could compare adoption barriers across data-intensive and SME-dominated activities. Regional research could analyze how peripheral, island, and low-density territories face distinct constraints compared with metropolitan innovation ecosystems.

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AUTHORS' CONTRIBUTIONS (CREDIT)

Conceptualization, FTT, MTBT; methodology, FTT, MTBT; validation, FTT, MTBT; resources, FTT, MTBT; data curation, FTT, MTBT; writing—original draft, FTT, MTBT; writing—review and editing, FTT, MTBT; project administration, FTT, MTBT.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

Data supporting the findings of this study are available upon reasonable request.

ETHICS STATEMENT

This study did not involve human participants or animals and therefore did not require ethical approval.

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Preparação e Aptidão Percecionada no Ensino Superior em Portugal

Preparation and Perceived Aptitude in Higher Education in Portugal

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Resumo

A transição do ensino secundário para o ensino superior é um momento crítico na trajetória educativa em Portugal, num cenário de diversificação de vias e de reformas na formação vocacional. Este estudo analisa a associação entre a via de conclusão do secundário e, no momento de ingresso, as perceções de preparação e o sentimento de aptidão entre estudantes do Ensino Científico-Humanístico e do Ensino Profissional. Com base numa amostra nacional de 1.044 estudantes já matriculados no ensino superior, aplicaram-se testes de associação e comparação entre grupos (Qui-quadrado e Mann–Whitney) e modelos de regressão logística binária e ordinal. Os resultados sugerem que estudantes do Ensino Profissional apresentam maior probabilidade de reportar preparação "totalmente adequada" (OR = 2.17) e de se sentirem "totalmente aptos" (OR = 1.79), ainda que com efeitos pequenos. Em contraste, estudantes do Ensino Científico-Humanístico concentram mais respostas nas categorias intermédias, sinalizando perceções menos positivas e maior ambivalência inicial. À luz de relatórios da OECD, European Commission, Eurydice e Cedefop, discutem-se implicações para políticas educativas, com ênfase na orientação escolar e na articulação entre níveis de ensino. Conclui-se que a via secundária se associa à vivência subjetiva da transição para o ensino superior, embora com magnitude limitada

Palavras–chave: Ensino secundário, ensino profissional, ensino cientifico-humanístico, transição educativa, preparação académica, ensino superior, Portugal

Abstract

The transition from upper secondary education to higher education is a critical moment in students' educational trajectories in Portugal, within a context of diversified pathways and ongoing reforms in vocational training. This study examines the association between the type of secondary education pathway completed and, now of entry into higher education, students' perceived preparation and sense of aptitude among those from Scientific Humanistic and Vocational Education tracks. Based on a national sample of 1,044 students already enrolled in higher education, we applied association and group comparison tests (Chi square and Mann–Whitney), as well as binary and ordinal logistic regression models. The results suggest that students from Vocational Education show a higher probability of reporting "fully adequate" preparation (OR = 2.17) and of feeling "fully capable" (OR = 1.79), although with small effect sizes. In contrast, students from the Scientific Humanistic track concentrate more frequently in intermediate response categories, indicating less positive perceptions and greater initial ambivalence. Drawing on reports from the OECD, European Commission, Eurydice and Cedefop, implications for education policy are discussed, with particular emphasis on school guidance and articulation between levels of education. Overall, the findings indicate that secondary education pathways are associated with the subjective experience of transitioning into higher education, although with limited magnitude.

Keywords: Upper secondary education, vocational education, scientific humanistic education, educational transition, academic preparation, higher education, Portugal

1. INTRODUÇÃO

A transição do ensino secundário para o ensino superior constitui um momento crítico na consolidação de trajetórias académicas e profissionais. Em Portugal, num contexto de reformas estruturais e de crescente valorização do Ensino Profissional, torna-se decisivo compreender de que modo as vias de formação condicionam a perceção de preparação e o sentimento de aptidão no ingresso ao ensino superior. A OECD (2025) observa que, apesar do aumento da participação no ensino superior, persistem desigualdades na forma como os estudantes avaliam a própria prontidão, sugerindo que o capital académico prévio e a natureza da via secundária permanecem determinantes na experiência de transição.

A *European Commission* (2025) enquadra esta passagem como particularmente exigente para estudantes provenientes de percursos profissionalizantes, historicamente atravessados por barreiras institucionais e percecionais no acesso e na integração. Contudo, esse diagnóstico não é linear. O Cedefop (2024) evidencia que percursos profissionais ancorados em componentes tecnológicas e práticas podem fortalecer a confiança na entrada, reconfigurando a ideia de desvantagem como um fenómeno contingente ao modo como competências são adquiridas e reconhecidas. A Eurydice (2025) acrescenta que políticas de flexibilização e reforço da orientação vocacional têm contribuído para reduzir disparidades estruturais entre vias, embora persistam diferenças em dimensões subjetivas autoconfiança, perceção de preparação e sentimento de aptidão que tendem a influenciar a adaptação académica. Em linha com este quadro, sínteses recentes em publicações internacionais (incluindo trabalhos reunidos na MDPI, 2025) indicam que estudantes de vias profissionais podem reportar maior sensação de prontidão em contextos mais aplicados, coexistindo com perceções de lacunas quando confrontados com exigências mais abstratas e teóricas.

Apesar deste debate, permanece limitada a evidência empírica portuguesa que compare diretamente estudantes do Ensino Científico-Humanístico e do Ensino Profissional na transição para o ensino superior a partir de indicadores subjetivos. Grande parte das análises privilegia métricas objetivas acesso e desempenho, deixando relativamente subexplorada a dimensão percecional que pode condicionar o ajustamento e o bem-estar no início do percurso académico. Assim, este estudo é guiado por duas questões de investigação: (RQ1) em que medida, estudantes do Ensino Científico-Humanístico e do Ensino Profissional diferem na perceção de preparação atribuída ao ensino secundário para o ingresso no ensino superior; e (RQ2) em que medida diferem no sentimento de aptidão no momento de entrada. A partir destas questões, testa-se a expectativa de que estudantes do Ensino Profissional reportem níveis mais elevados em ambas as dimensões, embora com magnitude pequena. Esta perceção de preparação e sentimento de aptidão podem ser enquadrados no âmbito da *Human Capital Theory*, na medida em que representam investimentos em competências que influenciam a empregabilidade futura e o desenvolvimento de uma postura empreendedora, nomeadamente através de maior persistência e capacidade de gerir incertezas.

2. ENQUADRAMENTO TEÓRICO

A passagem do ensino secundário para o ensino superior pode ser entendida como um processo de ajustamento académico e social no qual crenças motivacionais e recursos acumulados antes do ingresso influenciam decisões de candidatura, expectativas, persistência e desempenho no primeiro ano. Em termos clássicos, a persistência é sensível

ao grau de integração académica e social no novo contexto (Tinto, 1975) e, em paralelo, escolhas e esforço são moldados por crenças de competência e de controlo percebido, em particular autoeficácia e expectativas de sucesso (Bandura, 1977; Eccles & Wigfield, 2002). Para efeitos empíricos, importa distinguir dois constructos frequentemente colapsados no discurso político: perceção de preparação e sentimento de aptidão. A perceção de preparação remete para uma avaliação subjetiva de prontidão face a tarefas e exigências típicas do ensino superior (por exemplo, métodos de estudo, escrita académica, avaliação), enquanto o sentimento de aptidão expressa uma crença de capacidade para ter sucesso no novo contexto, conceptualmente próxima da autoeficácia académica e/ou de componentes do auto-conceito académico (Bandura, 1977; Marsh & Shavelson, 1985). Esta distinção é crucial porque estudantes podem reportar prontidão elevada em domínios aplicados e, simultaneamente, reservas perante exigências teóricas, produzindo perfis assimétricos de confiança e preparação percebida. sta distinção ganha particular relevância quando se considera o contributo destas crenças para o desenvolvimento de competências transversais associadas à empregabilidade e ao *entrepreneurial mindset* no contexto da gestão do ensino superior.

Neste quadro, o caso português é particularmente relevante pela coexistência de vias secundárias com finalidades diferenciadas: o Ensino Científico-Humanístico tende a privilegiar uma preparação académica generalista e orientada para exigências teóricas, ao passo que o Ensino Profissional/VET enfatiza competências técnicas, aprendizagem aplicada e ligação ao trabalho. Evidência qualitativa recente em Portugal documenta precisamente esta tensão, evidenciando confiança em competências práticas coexistindo com reservas quanto à densidade teórica e ao valor percebido do ensino superior, frequentemente sob constrangimentos financeiros e sob influência de redes familiares e de pares com menor experiência educativa (Tavares et al., 2024; Antunes et al., 2026). Este padrão sugere que a via pode influenciar a transição por mecanismos diferenciados, reforçando crenças de competência em tarefas contextualizadas sem garantir, necessariamente, a mesma confiança perante exigências teóricas, e que a prontidão percebida pode depender do grau de congruência entre a preparação adquirida e o tipo de exigência do curso de ingresso.

A literatura empírica sobre o primeiro ano universitário reforça a relevância destes mecanismos motivacionais e de ajustamento. Estudos com estudantes do primeiro ano mostram associações sistemáticas entre autoeficácia académica, autorregulação/engajamento e resultados académicos, incluindo indicadores de desempenho e intenção de persistir, sugerindo que crenças de competência e ajustamento são substantivas e não meramente "perceções" (van Rooij et al., 2018; Fokkens-Bruinsma et al., 2021). No domínio VET, evidência recente indica que a autoeficácia varia significativamente entre programas e contextos de aprendizagem, reforçando a heterogeneidade interna das vias e a necessidade de medir diretamente prontidão e aptidão percecionadas, em vez de inferi-las a partir de rótulos institucionais (de Groot et al., 2025). Em simultâneo, a evidência não suporta uma "vantagem" linear do VET na progressão para o ensino superior: há sinais de efeitos de *tracking*, restrições informacionais e escolhas condicionadas, com concentração desproporcional em instituições e áreas menos prestigiadas, para além de diferenças de preparação (Hoelscher et al., 2008). Assim, mesmo quando percursos vocacionais fortalecem competências aplicadas e confiança em tarefas contextualizadas, podem persistir barreiras estruturais que condicionam decisões de prosseguir estudos, opções de curso/instituição e antecipações sobre exigências académicas; no caso português, esta leitura é compatível com evidência qualitativa que destaca pressões económicas, perceções de irrelevância do conhecimento universitário e

limitações de capital informacional como fatores que reduzem a viabilidade percecionada da progressão no imaginário vocacional (Antunes et al., 2026).

Relatórios europeus e nacionais mantêm utilidade para contextualização macro equidade, participação e alinhamento de competências, mas a sua contribuição deve ser tratada como contextual e não como evidência explicativa. Diagnósticos recentes apontam determinantes anteriores à candidatura, incluindo resultados prévios, condições financeiras e informação/orientação, justificando a relevância do problema e a plausibilidade de co-variáveis como género, recursos socioeconómicos e área do curso (OECD, 2025; European Commission, 2025). Contudo, estes instrumentos operam tipicamente com indicadores agregados e definições heterogéneas, pelo que a inferência sobre mecanismos e diferenças percecionais exige evidência empírica primária.

Deste modo, o gap em Portugal não se reduz à escassez de estudos, mas à falta de evidência quantitativa comparativa, em amostras amplas, que confronte diretamente estudantes do Ensino Científico-Humanístico e do Ensino Profissional na transição para o ensino superior com indicadores subjetivos explicitamente definidos (perceção de preparação versus aptidão percecionada) e com controlo de fatores de base. A evidência qualitativa clarifica mecanismos autoeficácia prática, reservas teóricas e barreiras económicas e informacionais, mas raramente quantifica padrões e probabilidades relativas de avaliações elevadas (Tavares et al., 2024; Antunes et al., 2026). Assim, o presente estudo posiciona-se como teste empírico comparativo focado em dois resultados percecionais centrais, interpretando diferenças entre vias à luz de um enquadramento motivacional e de ajustamento (Bandura, 1977; Eccles & Wigfield, 2002; Marsh & Shavelson, 1985; Tinto, 1975) e discutindo implicações para intervenções orientadas a perfis, incluindo reforço de competências teóricas e literacias académicas quando necessário, consolidação de oportunidades aplicadas, e mitigação de barreiras informacionais e financeiras, em linha com a agenda europeia para equidade e sucesso no ensino superior (OECD, 2025; European Commission, 2025).

3. METODOLOGIA

Foi conduzido um estudo quantitativo, transversal e observacional, com o objetivo de comparar, no momento de ingresso no ensino superior, (i) a perceção de preparação atribuída ao ensino secundário e (ii) o sentimento de aptidão percebida entre estudantes provenientes do Ensino Científico-Humanístico e do Ensino Profissional. O desenho é adequado para identificar padrões de associação entre via de proveniência e resultados percecionais, não permitindo inferência causal.

Responderam ao inquérito 1.117 participantes. Para assegurar comparabilidade entre vias no contexto nacional, foram incluídos 1.044 estudantes que concluíram o ensino secundário em Portugal, tendo sido excluídos 73 respondentes que realizaram o secundário fora do país. A amostra incluiu 624 participantes do sexo feminino, 419 do sexo masculino e 1 noutra categoria; a idade média foi 21,7 anos (amplitude 17–71). Em termos de via secundária, 725 participantes provinham do Ensino Científico-Humanístico, 297 do Ensino Profissional e 22 assinalaram outras vias; 906 frequentaram escolas públicas e 138 privadas. A maioria encontrava-se entre o 1.º e o 3.º ano do ensino superior, e 146 reportaram já ter frequentado anteriormente outra instituição de ensino superior. A amostragem foi não probabilística por conveniência, pelo que a generalização deve ser interpretada com cautela e circunscrita a estudantes já matriculados no ensino superior. Este ponto é particularmente importante porque o estudo não estima probabilidades de ingresso no ensino superior entre diplomados do secundário; estima, antes, associações entre via de proveniência e perceções

no subconjunto que efetivamente ingressou, o que pode introduzir viés de seleção (por exemplo, diferenças de composição entre vias nos que entram).

Os dados foram recolhidos através de um questionário online autoaplicado, composto por variáveis sociodemográficas e de percurso escolar (via de ensino, tipo de escola e historial académico), um item sobre perceção de preparação para o ensino superior, um item sobre sentimento de aptidão no momento de ingresso e campos abertos complementares utilizados apenas para caracterização e verificação de consistência. A perceção de preparação foi medida pelo item "Considera que o ensino secundário o preparou para o ensino superior?", numa escala ordinal de quatro níveis (1 = Nada; 2 = Pouco; 3 = Bastante; 4 = Muito). O sentimento de aptidão foi medido pelo item "Quando ingressei no ensino superior senti-me…", igualmente numa escala ordinal de quatro níveis (1 = Nada apto; 2 = Pouco apto; 3 = Bastante apto; 4 = Muito apto). Optou-se por itens únicos por se tratar de um inquérito de aplicação ampla e de baixo ónus para os participantes; reconhece-se, contudo, que itens únicos não permitem estimar fiabilidade interna e podem reduzir precisão psicométrica, pelo que a interpretação se centra em padrões de associação e não em mensuração exaustiva dos constructos.

As respostas às variáveis principais foram codificadas como ordinais (1–4) para comparações entre grupos e modelação ordinal. Para testar o padrão de resposta no extremo superior, foram construídas variáveis binárias contrastando a categoria máxima (4) versus todas as restantes (1–3), utilizadas em regressões logísticas binárias. A via de proveniência no secundário foi tratada como variável explicativa principal, distinguindo Ensino Científico-Humanístico e Ensino Profissional; as respostas assinaladas como "outras vias" foram descritas na caracterização, mas excluídas das comparações inferenciais para preservar comparabilidade entre grupos. O tratamento de omissões seguiu uma estratégia complete-case nas variáveis principais, com exclusão apenas quando havia *missing* em preparação e/ou aptidão, e retenção quando a omissão ocorria em variáveis secundárias não utilizadas nas análises principais; o N efetivo de cada teste e modelo é reportado na secção de Resultados. A preparação do conjunto de dados incluiu ainda normalização limitada de campos abertos para reduzir variação ortográfica e permitir inspeção de consistência, bem como verificação de inconsistências lógicas, mantendo-se apenas os casos em que a inconsistência era compatível com lapsos de preenchimento não substantivos.

O questionário foi divulgado através de canais institucionais e redes digitais associadas a estudantes e instituições do ensino superior (por exemplo, *mailing lists*, redes sociais de associações estudantis e grupos informativos dirigidos a candidatos e estudantes), com o objetivo de alcançar estudantes matriculados no ensino superior que tivessem concluído o secundário em Portugal e que representassem ambas as vias. A participação foi voluntária, anónima e não remunerada, tendo sido obtido consentimento informado antes do início do inquérito mediante confirmação explícita de leitura e concordância com a participação, com possibilidade de abandono a qualquer momento.

A estratégia de análise estatística foi definida a priori e implementada em software estatístico apropriado, adotando-se testes bicaudais e um nível de significância de $\alpha = 0{,}05$. As distribuições de resposta por via foram comparadas com testes de associação para variáveis categoriais (Qui-quadrado), reportando tamanho de efeito através de Cramér's V. Para comparar a localização ordinal entre grupos, aplicaram-se testes não paramétricos (Mann–Whitney), com reporte de tamanho de efeito (r), quando aplicável. Para modelação, estimaram-se regressões logísticas binárias para a probabilidade de resposta na categoria máxima (4 vs 1–3) e regressões logísticas ordinais para a variação ao longo da escala

completa (1–4). As estimativas foram reportadas como razões de odds (OR), intervalos de confiança a 95% e níveis de significância. O pressuposto de odds proporcionais (proportional odds) foi avaliado através de um procedimento formal disponibilizado pelo software; caso a proporcionalidade não fosse suportada, estavam previstas análises de sensibilidade adequadas a dados ordinais, incluindo modelos com relaxamento do pressuposto ou abordagem multinomial, preservando a comparação entre vias como foco principal. Para reduzir viés por composição, as regressões foram estimadas em duas etapas: um modelo não ajustado (via como preditor único) e um modelo ajustado por covariáveis de base disponíveis no questionário, incluindo idade, sexo, tipo de escola (pública/privada), ano de frequência no ensino superior e historial de frequência prévia noutra instituição de ensino superior. Os resultados foram interpretados como associações, condicionais ao desenho transversal e ao processo amostral.

O estudo respeitou princípios éticos aplicáveis a investigação com seres humanos, incluindo confidencialidade, voluntariedade e minimização de risco. Não foram recolhidos dados identificáveis (por exemplo, nome, contactos ou número de aluno) e os participantes puderam abandonar o questionário a qualquer momento. As instituições AEVA e ISCIA analisaram o protocolo e confirmaram por escrito que, dada a natureza anónima, não interventiva e não sensível da recolha, o estudo se enquadrava em critérios de isenção de revisão ética formal.

4. RESULTADOS

As análises foram conduzidas em R (v4.3) e IBM SPSS Statistics (v29). Para responder ao objetivo comparativo, adotou-se uma estratégia multimétodo, combinando descrição das distribuições categoriais, testes de associação e comparação ordinal e modelação (binária e ordinal), de modo a captar simultaneamente diferenças na distribuição das respostas, deslocações ao longo da escala e variação na probabilidade de seleção da categoria máxima.

4.1 PERCEÇÃO DE PREPARAÇÃO ATRIBUÍDA AO ENSINO SECUNDÁRIO

Na variável *perceção de preparação* ("Considera que o ensino secundário o preparou para o ensino superior?"), as distribuições evidenciaram maior concentração do Ensino Científico-Humanístico nas categorias intermédias, enquanto o Ensino Profissional apresentou maior proporção na categoria máxima. Em particular, a resposta "Sim, totalmente" foi selecionada por 8,7% dos estudantes do Científico-Humanístico (63/725) e por 17,5% dos estudantes do Profissional (52/297). Nas restantes categorias, observaram-se as seguintes proporções: "Não, de maneira nenhuma" (11,9% vs 13,5%), "Só para uma pequena parte das disciplinas" (48,4% vs 42,4%) e "Sim, na maioria das disciplinas" (31,0% vs 26,6%). O teste de associação indicou diferenças estatisticamente significativas entre vias, $\chi^2(3) = 18{,}02$, $p = 0{,}000437$, com V de Cramer = 0,133, sugerindo efeito pequeno. Contudo, a comparação ordinal entre grupos por Mann–Whitney não atingiu significância estatística ($U = 101\,183{,}5$, $p = 0{,}105$), apesar de a média ordinal ter sido ligeiramente superior no grupo Profissional (2,48 vs 2,37). Em termos substantivos, estes resultados sugerem que as diferenças na preparação se expressam sobretudo na cauda superior da distribuição (categoria máxima), mais do que numa deslocação consistente ao longo de toda a escala.

4.2 SENTIMENTO DE APTIDÃO NO INGRESSO NO ENSINO SUPERIOR.

Na variável *sentimento de aptidão* ("Quando ingressei no ensino superior senti-me..."), observou-se um padrão análogo, com maior concentração do Científico-Humanístico em categorias intermédias e maior concentração do Profissional nas categorias superiores. A resposta "Totalmente apto" foi selecionada por 10,0% dos estudantes do Científico-Humanístico (72/720) e por 16,6% do Profissional (49/296). Adicionalmente, a categoria

"Muito apto" foi mais frequente no Profissional (47,6% vs 42,6%), enquanto "Pouco apto" foi mais frequente no Científico-Humanístico (42,1% vs 31,8%); "Nada apto" foi pouco frequente em ambos (5,3% vs 4,1%). A associação entre via e distribuição de respostas foi estatisticamente significativa, $\chi^2(3) = 15,12$, $p = 0,00172$, com V de Cramer = 0,122, também indicando efeito pequeno. Ao nível ordinal, verificou-se diferença estatisticamente significativa entre vias ($U = 91\,838,5$, $p < 0,001$), com média ordinal superior no Ensino Profissional (2,77 vs 2,57), sugerindo uma deslocação mais consistente para categorias mais elevadas ao longo da escala.

4.3 Contraste do extremo superior e modelação ordinal.

Para captar especificamente o polo superior de avaliação, analisou-se a dicotomização categoria máxima (4) vs restantes (1–3). Nesta leitura, estudantes do Ensino Profissional evidenciaram maior propensão para selecionar a categoria máxima em ambas as variáveis. Em preparação, a OR bruta (a partir das contagens observadas) para responder "Sim, totalmente" foi 2,23, IC95% [1,50; 3,31]. Em aptidão, a OR bruta para responder "Totalmente apto" foi 1,79, IC95% [1,21; 2,64]. Estas estimativas brutas são substantivamente consistentes com as estimativas obtidas em regressão logística binária não ajustada reportadas nas tabelas, reforçando a robustez do contraste no extremo superior. Na regressão logística ordinal (escala completa 1–4), o efeito da via não foi estatisticamente significativo para preparação (coef. = 0,206, $p = 0,115$), enquanto foi significativo e positivo para aptidão (coef. = 0,493, $p < 0,001$), indicando maior probabilidade de estudantes do Ensino Profissional se posicionarem em categorias mais elevadas ao longo da escala. O pressuposto de odds proporcionais foi avaliado no diagnóstico do modelo e, atendendo à possibilidade de padrões distintos ao longo dos pontos de corte em modelos ordinais, a interpretação foi efetuada em triangulação com os testes não paramétricos e com os contrastes binários no extremo superior, assegurando consistência substantiva entre abordagens.

4.4. Tabelas

A Tabela 1 revela a distribuição das respostas sobre a preparação para o Ensino Superior: os alunos de Ensino Profissional manifestam uma maior proporção de respostas na categoria mais positiva (Sim, totalmente: 17,5%) em relação aos de Ensino Regular (8,7%), enquanto os Regular reportam maiores percentagens nas categorias intermédias, sobretudo só para uma pequena parte das disciplinas.

Tabela 1 - *Distribuição das respostas, Preparação para o Ensino Superior*

Categoria	N Regular	% Regular	N Profissional	% Profissional
Não, de maneira nenhuma	86	11,9	40	13,5
Só para uma pequena parte das disciplinas	351	48,4	126	42,4
Sim, na maioria das disciplinas	225	31,0	79	26,6
Sim, totalmente	63	8,7	52	17,5

A Tabela 2 mostra a distribuição das respostas sobre o sentimento ao ingressar no Ensino Superior: o grupo Profissional concentra uma maior proporção nas categorias mais elevadas (Muito apto e Totalmente apto): 47,5% e 16,5% versus 42,3% e 9,9% para o Regular, ilustrando maior conforto e confiança no ingresso.

Tabela 2 - *Distribuição das respostas, Sentimento ao Ingresso no Ensino Superior*

Categoria	N Regular	% Regular	N Profissional	% Profissional
Nada apto	38	5,3	12	4,1
Pouco apto	303	42,1	94	31,8
Muito apto	307	42,6	141	47,6
Totalmente apto	72	10,0	49	16,6

A Tabela 3 apresenta os resultados dos testes de qui-quadrado: ambas as variáveis ('Preparação' e 'Sentimento') exibem associações significativas com o tipo de ensino ($p < 0,01$ e $p < 0,05$ respetivamente), com índices de V de Cramer na faixa de efeito pequeno (0,124–0,133), indicando que as distribuições de categorias diferem de forma relevante entre Regular e Profissional.

Tabela 3 - *Qui-quadrado, Associação entre tipo de ensino e respostas*

Variável	χ^2	*p*	V de Cramer
Preparação	18,02	0,000437	0,133
Sentimento	15,12	0,00172	0,122

Na Tabela 4, os resultados da ANOVA unifatorial demonstram que, embora exista uma leve tendência de maior média na avaliação de preparação pelo grupo Profissional, apenas a variável 'Sentimento' atinge significância estatística clara ($p < 0.001$), confirmando diferenças entre grupos na sensação de aptidão no ingresso.

Tabela 4 - *Mann–Whitney e ANOVA (escalas codificadas 1–4)*

Variável	U (MW)	*p* (MW)	Média Regular	Média Profissional	F (ANOVA)	*p*(ANOVA)
Preparação	101 183,5	0,105	2,37	2,48	3,64	0,0567
Sentimento	91 838,5	0,000176	2,57	2,77	13,92	0,000202

A Tabela 5 resume os modelos de regressão logística binária, demonstrando que ser do grupo Profissional aumenta a probabilidade de registar as respostas extremas positivas: as odds multiplicam por aproximadamente 0.775 na 'Preparação' ($p< 0,001$) e por 0.580 no 'Sentimento' ($p < 0,004$), evidenciando o impacto positivo da educação profissional na perceção de completa preparação e aptidão.

Tabela 5 - *Regressão Logística Binária, Categoria máxima vs. restantes*

Modelo	Coef. (Prof)	*p*	Odds Ratio
Preparação ("Sim, totalmente")	0,775	< 0,001	2,17
Sentimento ("Totalmente apto")	0,580	0,004	1,79

Na Tabela 6, os coeficientes estimados nos modelos de regressão logística ordinal confirmam a tendência: apenas o modelo de 'Sentimento' é significativamente diferente de zero (coef = 0,493, $p < 0,001$), o que reforça que os Profissionais se situam em categorias superiores de aptidão. Para 'Preparação' o coeficiente não alcança significância ($p = 0,115$), espelhando a nuance dos achados em que os efeitos são mais pronunciados nas extremidades da distribuição.

Tabela 6 - *Regressão Logística Ordinal, Escala completa (1–4)*

Modelo	Coef. (Prof)	*p*
Preparação	0,206	0,115
Sentimento	0,493	< 0,001

No conjunto, os resultados indicam associações estatisticamente significativas entre via e perceções no ingresso ao ensino superior, mas de magnitude pequena (V ≈ 0,12–0,13). A evidência é mais consistente para aptidão percebida, onde se observa deslocação ao longo da escala e efeito positivo no modelo ordinal. Em preparação, as conclusões dependem do nível de análise: as diferenças são mais visíveis na categoria máxima (contraste binário) do que na ordenação/escala completa, sugerindo heterogeneidade nos perfis percecionais entre vias e uma diferenciação mais marcada no polo superior de avaliação.

5. Discussão

Os resultados evidenciam diferenças sistemáticas entre estudantes provenientes do Ensino Científico-Humanístico e do Ensino Profissional em Portugal, tanto na preparação percecionada atribuída ao ensino secundário como, de forma mais robusta, no sentimento de aptidão no ingresso no ensino superior. A interpretação destes padrões deve ser calibrada por duas cautelas centrais. Primeiro, as magnitudes observadas são pequenas (V de Cramer ≈ 0,12–0,13), o que sugere diferenças relevantes ao nível do sistema e da experiência de transição, mas insuficientes para sustentar leituras deterministas ao nível individual. Segundo, a amostra integra apenas estudantes que efetivamente ingressaram no ensino superior, pelo que os resultados descrevem perceções entre ingressantes e podem refletir mecanismos de seleção e composição diferencial por via, aspeto particularmente discutido na literatura sobre transições do ensino profissional para o ensino superior (Hoelscher et al., 2008; OECD, 2025). Ainda assim, a convergência entre descrições, testes e modelos sustenta a consistência interna do padrão identificado.

No que respeita à preparação percecionada, o contraste entre vias manifesta-se sobretudo no polo superior da distribuição, sem evidência de uma deslocação robusta ao longo de toda a escala. Embora a associação global entre via e distribuição seja significativa (χ^2 e V reportados na secção de Resultados), as análises que captam a escala completa não confirmam diferenças consistentes, ao passo que o foco na categoria máxima evidencia um diferencial claro a favor do Ensino Profissional. Este perfil diferença concentrada na cauda superior sugere heterogeneidade interna dentro da via profissional, na medida em que pode estar em causa um subgrupo que se perceciona como muito bem preparado, sem alteração substantiva da tendência central da distribuição. Tal leitura é compatível com o enquadramento europeu que associa o VET ao reforço de competências contextualizadas, aprendizagem orientada para problemas e ligação ao mundo do trabalho, dimensões que podem potenciar perceções de prontidão funcional, sobretudo quando existe alinhamento com cursos de matriz aplicada no ensino superior (Cedefop, 2025; European Commission, 2025). Em paralelo, estudos qualitativos em Portugal apontam para a coexistência de confiança em competências práticas e reservas quanto à preparação teórica e às literacias académicas, o que é congruente com um padrão em que apenas uma fração se posiciona no extremo superior de "total preparação" (Tavares et al., 2024; Antunes et al., 2026).

Importa, contudo, reconhecer explicações alternativas para a concentração do efeito no extremo superior. Em primeiro lugar, a diferença pode refletir seleção positiva entre estudantes do ensino profissional que ingressam no ensino superior, hipótese consistente

com evidência que descreve constrangimentos estruturais e trajetórias diferenciadas na passagem do ensino profissional para o ensino superior (Hoelscher et al., 2008). Em segundo lugar, o padrão pode ser influenciado por composição por área ou curso e tipo de instituição, fatores que podem modificar a perceção de adequação entre preparação e exigências. Em terceiro lugar, a utilização de itens únicos pode introduzir diferenças de interpretação do item e efeitos de resposta extrema. Estas possibilidades não invalidam o resultado, mas delimitam a sua interpretação e orientam futuras análises com maior granularidade, incluindo estratificação por área ou curso e modelação com variáveis contextuais adicionais.

O sentimento de aptidão apresenta um padrão mais coerente e consistente com a literatura sobre transições e ajustamento no primeiro ano. Para além da associação global, observa-se deslocação ao longo da escala e efeito positivo no modelo ordinal, bem como maior propensão para a categoria máxima no Ensino Profissional. Este resultado é teoricamente congruente com a centralidade das crenças de competência e da autoeficácia no início de trajetórias académicas, uma vez que a autoeficácia influencia o modo como os estudantes interpretam exigências, mobilizam esforço e persistem perante dificuldades (Bandura, 1977). Complementarmente, a literatura sobre integração académica e social sublinha que a adaptação ao contexto institucional e ao ecossistema de expectativas do ensino superior é determinante para persistência e sucesso, sobretudo no primeiro ano (Tinto, 1975). Evidência empírica recente reforça que autoeficácia académica, envolvimento e autorregulação se associam ao desempenho no primeiro ano, sugerindo que níveis mais elevados de confiança inicial podem constituir um recurso relevante na transição (van Rooij et al., 2018; Fokkens-Bruinsma et al., 2021). No domínio do ensino profissional, estudos indicam variação substantiva de autoeficácia entre programas, apoiando a ideia de heterogeneidade e a plausibilidade de perfis motivacionais diferenciados entre estudantes vocacionais que prosseguem estudos (de Groot et al., 2025).

Em termos teóricos, a dissociação entre preparação percecionada (efeito mais saliente no extremo superior) e aptidão percebida (efeito consistente ao longo da escala) sugere que estes constructos, embora relacionados, capturam mecanismos distintos na transição. A preparação parece mais sensível ao alinhamento entre características do percurso secundário e exigências antecipadas do curso, enquanto a aptidão reflete mais diretamente uma crença global de capacidade para enfrentar o novo contexto, compatível com o conceito de autoeficácia (Bandura, 1977). Esta distinção é consistente com abordagens que conceptualizam crenças de competência e auto-perceções como multifacetadas, recomendando cautela em colapsar dimensões distintas num único indicador de "prontidão" (Marsh & Shavelson, 1985; Eccles & Wigfield, 2002).

As implicações para política e prática devem ser proporcionais ao tamanho do efeito, privilegiando intervenções de elevado alcance e baixo custo marginal, particularmente no primeiro semestre, período frequentemente identificado como crítico para equidade e sucesso (OECD, 2025; European Commission, 2025; Cedefop, 2025). Para estudantes do Ensino Científico-Humanístico, a maior concentração em categorias intermédias sugere a relevância de dispositivos de transição orientados para métodos de estudo no ensino superior, mentoria entre pares e suporte psicopedagógico centrado na integração académica e social. Para estudantes do Ensino Profissional, a evidência de maior aptidão percebida pode ser capitalizada, reforçando simultaneamente dispositivos de ponte para exigências teóricas, incluindo nivelamento em literacias académicas, leitura e escrita, sobretudo em cursos com maior densidade abstrata.

Estes resultados podem informar a gestão institucional do ensino superior, nomeadamente através do desenho de políticas de orientação e suporte à transição que promovam a empregabilidade e o desenvolvimento de um entrepreneurial mindset. A maior aptidão percebida observada nos estudantes do Ensino Profissional sugere a oportunidade de capitalizar esta confiança inicial em programas que reforcem competências transversais como a autorregulação, a persistência e a capacidade de gerir incertezas, dimensões centrais tanto para o sucesso académico como para a inserção profissional e empreendedora. Já a ambivalência mais marcada nos estudantes do Ensino Científico-Humanístico aponta para a necessidade de intervenções de nivelamento e mentoria que mitiguem lacunas percecionadas, contribuindo para uma maior equidade na preparação para o mercado de trabalho. Tais estratégias devem ser proporcionais aos efeitos pequenos observados e acompanhadas de monitorização contínua.

Para robustecer a utilidade destas recomendações, a implementação de medidas deve ser acompanhada por indicadores objetivos de avaliação, como retenção no 1.º ano, ECTS concluídos e métricas breves de ajustamento e autoeficácia recolhidas ao longo do primeiro semestre (van Rooij et al., 2018; Fokkens-Bruinsma et al., 2021).

As limitações do estudo são estruturais e devem ser explicitamente consideradas. A amostragem por conveniência limita a generalização; as medidas são autorrelatadas e baseadas em itens únicos; o desenho transversal impede inferência causal; e a ausência de indicadores objetivos (ECTS, médias e retenção) restringe a articulação entre perceções e desempenho efetivo. Acresce a limitação de seleção associada ao facto de a amostra incluir apenas ingressantes, pelo que não informa diretamente sobre probabilidades de ingresso entre diplomados do secundário, tema central na investigação sobre percursos do ensino profissional para o ensino superior (Hoelscher et al., 2008; OECD, 2025). Estudos futuros deverão privilegiar desenhos longitudinais que acompanhem estudantes desde o secundário até ao primeiro ano do ensino superior, integrar dados institucionais e operacionalizar preparação e aptidão de forma multidimensional (por exemplo, componentes teóricas e práticas, autoeficácia académica, ajustamento), bem como incorporar variáveis de contexto (área ou curso, tipo de instituição e proxies socioeconómicos) para distinguir efeitos de via de efeitos de composição e seleção.

Em síntese, a via secundária associa-se a diferenças pequenas, mas consistentes, na experiência de transição, com evidência mais robusta para a aptidão percebida e um contraste mais concentrado no polo superior da preparação percecionada. Os resultados sugerem que, entre os estudantes que ingressam no ensino superior, a via profissional se associa a níveis mais elevados de confiança inicial, potencialmente relevantes para a adaptação, enquanto a preparação percecionada revela maior heterogeneidade, plausivelmente dependente do alinhamento entre perfil de formação e exigências do curso. Estes achados reforçam a necessidade de suportes de transição calibrados por perfil e acompanhados por monitorização com indicadores objetivos de sucesso no primeiro ano.

6. Conclusão

O presente estudo comparou, no contexto português, a perceção de preparação atribuída ao ensino secundário e o sentimento de aptidão no ingresso no ensino superior entre estudantes do Ensino Científico-Humanístico e do Ensino Profissional, com base numa amostra de 1.044 participantes e numa estratégia analítica multimétodo. Globalmente, os resultados convergem num padrão claro: estudantes oriundos do Ensino Profissional reportam, em média, maior confiança inicial no ingresso, evidenciada por diferenças estatisticamente consistentes no sentimento de aptidão, e apresentam também maior

propensão para avaliações máximas de preparação, embora esta última diferença se manifeste sobretudo no polo superior da distribuição. Importa salientar que, apesar da consistência estatística, as magnitudes observadas são pequenas (V de Cramer ≈ 0,12–0,13), sugerindo diferenças relevantes ao nível do sistema e da experiência de transição, mas insuficientes para sustentar leituras deterministas ao nível individual.

A combinação de testes categoriais, ordinais e modelos de regressão permitiu distinguir dois comportamentos empíricos relevantes. Por um lado, a aptidão percebida revela um efeito mais consistente, com deslocação ao longo da escala e associação positiva no modelo ordinal, sugerindo uma diferença transversal e não limitada a respostas extremas. Por outro lado, a preparação percecionada mostra um padrão mais subtil, em que a via profissional se diferencia principalmente na probabilidade de selecionar a categoria máxima, sem uma deslocação robusta ao longo de toda a escala. Esta dissociação reforça a utilidade de tratar "preparação" e "aptidão" como dimensões relacionadas, mas não equivalentes, e é compatível com a hipótese de que a formação profissional, ao enfatizar competências aplicadas e aprendizagem contextualizada, pode potenciar a confiança inicial dos estudantes quando existe alinhamento entre o perfil da formação secundária e as exigências do curso de ingresso.

As implicações para política e prática devem ser proporcionais ao tamanho dos efeitos e orientadas para intervenções escaláveis no primeiro semestre, período crítico da transição. Para estudantes do Ensino Científico-Humanístico, os resultados sustentam a necessidade de reforçar dispositivos de transição centrados em métodos de estudo universitários, autorregulação, mentoria entre pares e suporte psicopedagógico de integração. Para estudantes do Ensino Profissional, os achados sugerem que importa capitalizar o capital de aptidão observado no ingresso, complementando-o com mecanismos de ponte para exigências teóricas e literacias académicas, sobretudo em cursos com maior densidade conceptual e menos nas áreas tecnológicas. Em termos sistémicos, os resultados reforçam a relevância de políticas que promovam permeabilidade, orientação escolar e equidade de acesso, alinhadas com prioridades europeias de modernização da formação profissional e de redução de barreiras informacionais e financeiras na transição para o ensino superior.

Este estudo apresenta limitações inerentes ao desenho transversal, ao uso de medidas autorrelatadas e à amostragem por conveniência, bem como ao facto de a amostra incluir apenas estudantes que ingressaram no ensino superior, o que pode refletir efeitos de seleção e composição por via. Apesar disso, a investigação contribui para a literatura ao oferecer evidência quantitativa comparativa, baseada em amostra ampla e análise multitécnica, sobre um tema ainda relativamente pouco explorado em Portugal com este nível de detalhe metodológico.

Investigações futuras deverão privilegiar desenhos longitudinais que acompanhem estudantes desde o final do ensino secundário até ao primeiro ano do ensino superior, integrar indicadores objetivos (por exemplo, ECTS concluídos, desempenho e retenção) e incorporar abordagens mistas que permitam compreender mecanismos subjacentes, incluindo o alinhamento entre via, área de curso e exigências curriculares, bem como o papel de fatores contextuais e socioeconómicos. Desta forma, os resultados sugerem que, embora os efeitos sejam pequenos, a transição secundário–superior constitui um ponto de elevada alavancagem para políticas e práticas institucionais: intervenções bem calibradas e orientadas a perfis podem produzir ganhos significativos de confiança, adaptação e sucesso académico em ambas as vias formativas.

Teoricamente, o estudo contribui para distinguir preparação percecionada e aptidão no quadro motivacional e de capital humano. Na prática, os achados oferecem pistas úteis à gestão do ensino superior na CPLP, reforçando a importância de estratégias institucionais que promovam a empregabilidade e o desenvolvimento de competências empreendedoras através de suportes diferenciados por via de proveniência.

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Conceptualization, HC, RP and SCM; methodology, HC, RP and SCM; formal analysis, HC, RP and SCM; investigation, HC, RP and SCM; data curation, HC, RP and SCM; writing—original draft preparation, HC, RP and SCM; writing—review and editing, HC, RP and SCM; supervision, HC, RP, SCM and FGP; project administration, HC, RP, SCM and FGP.

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The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

Data supporting the findings of this study are available upon reasonable request.

ETHICS STATEMENT

This study involved human participants. Participation was voluntary, anonymous, and based on informed consent. No personally identifiable information was collected, and participants could withdraw from the study at any time. The institutions AEVA and ISCIA reviewed the study protocol and confirmed that, due to its anonymous, non-interventional, and non-sensitive nature, formal ethical approval was not required.

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Otimismo nos jovens do ensino superior de Portugal: uma análise das propriedades psicométricas da LOT-R

Optimism in young people in higher education in Portugal: an analysis of the psychometric properties of LOT-R

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Resumo

O presente estudo avaliou as propriedades psicométricas da versão portuguesa do LOT-R (Life Orientation Test-Revised) numa amostra de 934 estudantes universitários portugueses. Adotou-se um delineamento quantitativo descritivo, com amostragem aleatória e coleta de dados por meio de questionário eletrónico estruturado. A adequação da matriz de correlações para análise fatorial foi confirmada pelo índice KMO = 0,70 (valor aceitável) e pelo Teste de Esfericidade de Bartlett (χ^2 = 1034,63; p < 0,0001), indicando correlações significativas entre os itens. A consistência interna da escala, avaliada pelo alfa de Cronbach, atingiu 0,68 valor considerado adequado para escalas breves de personalidade e consistente com estudos anteriores realizados em Portugal (Laranjeira, 2008) e no Brasil (Bandeira et al., 2002). A análise fatorial exploratória, com extração de dois fatores sem rotação, corroborou a estrutura teórica proposta, que diferencia Otimismo e Não-pessimismo. O Fator 1 (Otimismo) explicou 39,18% da variância total, enquanto o Fator 2 (Não-pessimismo) contribuiu adicionalmente, alcançando 60,12% da variância conjunta. As cargas fatoriais dos itens positivos no Fator 1 variaram de 0,456 a 0,703. Já os itens negativos apresentaram cargas elevadas no Fator 1 (0,430 a 0,742) e cargas negativas no Fator 2 (-0,312 a -0,620), confirmando o padrão bifatorial característico do instrumento. Os resultados indicam que a versão portuguesa do LOT-R possui propriedades psicométricas satisfatórias para uso em populações universitárias, sustentando sua validade como medida de otimismo disposicional. A estrutura bifatorial observada está alinhada com evidências internacionais (Marshall et al., 1992; Ribeiro et al., 2012; Bastianello et al., 2014), reforçando a robustez conceitual e a aplicabilidade transcultural do instrumento. Esses achados contribuem para o estudo de variáveis disposicionais positivas que, juntamente com construtos motivacionais como as teorias implícitas de inteligência (Dweck & Leggett, 1988), ajudam a prever padrões de adaptação e persistência em momentos críticos de transição académica.

Palavras-chave: Otimismo disposicional, Life Orientation Test-Revised, propriedades psicométricas, estudantes universitários

Abstract

The present study evaluated the psychometric properties of the Portuguese version of the LOT-R (Life Orientation Test-Revised) in a sample of 934 Portuguese university students. A descriptive quantitative design was adopted, with random sampling and data collection through a structured electronic questionnaire. The adequacy of the correlation matrix for factor analysis was confirmed by the KMO index = 0.70 (acceptable value) and by the Bartlett sphericity test (χ^2 = 1034.63; p < 0.0001), indicating significant correlations between the items. The internal consistency of the scale, assessed by Cronbach's alpha, reached 0.68, which is considered adequate for brief personality scales and

consistent with previous studies conducted in Portugal (Laranjeira, 2008) and Brazil (Bandeira et al., 2002). The exploratory factor analysis, with two-factor extraction without rotation, corroborated the proposed theoretical structure, which differentiates Optimism and Non-pessimism. Factor 1 (Optimism) explained 39.18% of the total variance, while Factor 2 (Non-pessimism) contributed additionally, reaching 60.12% of the joint variance. The factor loadings of the positive items in Factor 1 ranged from 0.456 to 0.703. On the other hand, the negative items presented high loads in Factor 1 (0.430 to 0.742) and negative loads in Factor 2 (-0.312 to -0.620), confirming the two-factor pattern characteristic of the instrument. The results indicate that the Portuguese version of the LOT-R has satisfactory psychometric properties for use in university populations, supporting its validity as a measure of dispositional optimism. The observed two-factor structure is in line with international evidence (Marshall et al., 1992; Ribeiro et al., 2012; Bastianello et al., 2014), reinforcing the conceptual robustness and cross-cultural applicability of the instrument. These findings contribute to the study of positive dispositional variables which, together with motivational constructs such as implicit theories of intelligence (Dweck & Leggett, 1988), help predict patterns of adaptation and persistence at critical moments of academic transition.

Keywords: Dispositional optimism, Life Orientation Test-Revised, psychometric properties, university students

INTRODUÇÃO

O otimismo disposicional, definido como uma expectativa generalizada relativamente estável de que resultados positivos ocorrerão no futuro, constitui um dos construtos centrais da Psicologia e tem sido amplamente investigado por meio do *Life Orientation Test-Revised* (LOT-R), desenvolvido por Scheier, Carver e Bridges (1994). Este instrumento, derivado da teoria de autorregulação comportamental proposta por Scheier e Carver (1985), representa uma revisão do LOT original que visou eliminar a sobreposição conceitual com construtos de afeto negativo, como o neuroticismo, mantendo o foco nas expectativas prospectivas enquanto cognição pura. Desde a sua publicação, o LOT-R tem sido objeto de intenso debate psicométrico, particularmente no que concerne à sua estrutura dimensional, com estudos internacionais apresentando evidências tanto para um modelo unifatorial, que concebe otimismo e pessimismo como polos opostos de um único contínuo (Scheier et al., 1994), quanto para um modelo bifatorial, que os trata como construtos relacionados mas distintos (Marshall et al., 1992). Em Portugal, a validação conduzida por Laranjeira (2008) com 790 estudantes universitários, utilizando análise fatorial exploratória com rotação ortogonal, identificou uma estrutura unidimensional explicando 45,87% da variância total, com consistência interna adequada (α=0,71). Contudo, Ribeiro, Pedro e Marques (2012), empregando análise fatorial confirmatória em amostras clínicas e da população geral, demonstraram que o modelo bifatorial apresentava ajuste estatisticamente superior, alinhando-se a achados internacionais de estudos em Espanha (Ferrando et al., 2002) e Brasil (Ottati & Noronha, 2017). Esta divergência metodológica entre análise exploratória e confirmatória tem implicações teóricas substantivas para a compreensão do construto e, consequentemente, para sua aplicação em contextos de investigação sobre adaptação universitária, persistência acadêmica e transições desenvolvimentais críticas, períodos nos quais, segundo Dweck (1986), padrões motivacionais adaptativos versus mal adaptativos manifestam-se com maior intensidade. Neste contexto, este estudo visa preencher esta lacuna por meio do exame rigoroso das propriedades psicométricas do LOT-R numa amostra aleatória de 934 estudantes universitários portugueses, com os seguintes objectivos específicos: (a) avaliar a consistência interna da escala mediante o coeficiente alfa de Cronbach; (b) testar a adequação da matriz de correlações à análise fatorial através dos índices Kaiser-Meyer-Olkin e do Teste de Esfericidade de Bartlett; e (c) determinar a estrutura fatorial do instrumento mediante análise fatorial exploratória com extração de dois fatores sem rotação, permitindo assim uma comparação metodologicamente informada com os

resultados contraditórios de Laranjeira (2008) e Ribeiro et al. (2012) e contribuindo para a resolução do debate internacional sobre a dimensionalidade do construto.

Referencial Teórico

O otimismo disposicional, conceptualizado por Scheier e Carver (1985) como uma expectativa generalizada e relativamente estável de que resultados positivos ocorrerão no futuro. Isto é, a inclinação em esperar resultados favoráveis de vida (Pante e Alba, 2018) constituindo-se como uma das variáveis disposicionais mais robustas no campo da Psicologia Positiva contemporânea (Khademi Astaneh, 2020, Solak e Anli, 2026). Este construto insere-se teoricamente no modelo de autorregulação comportamental proposto por Carver e Scheier (1981), segundo o qual o comportamento humano é fundamentalmente orientado por objetivos e as expectativas que os indivíduos mantêm acerca da possibilidade de alcançar tais objetivos determinam de forma crucial a sua persistência, o investimento de esforço e as estratégias de enfrentamento perante obstáculos. Nesta perspetiva, o otimismo disposicional diferencia-se conceptualmente de estados afetivos transitórios ou de construtos de afeto negativo, como o neuroticismo ou a ansiedade-traço, ao focar especificamente nas cognições prospetivas sobre resultados futuros (Scheier, et al. 1994), embora segundo de Meza e Dawson (2021) não é tão fácil demonstrar os seus benefícios. Além disso, para Bel-Álvarez et al.(2026) também não está claro como a interação social pode modulá-lo.

A mensuração deste construto tem sido predominantemente realizada por meio do Life Orientation Test-Revised (LOT-R), instrumento desenvolvido por Scheier et al. (1994) como uma revisão do LOT original de 1985. Seu objetivo destina-se precisamente a eliminar a sobreposição conceitual identificada por críticos que argumentavam que o instrumento inicial avaliava, em parte, a ausência de afeto negativo em vez de uma presença genuína de expectativas positivas. O LOT-R, composto por dez itens dos quais seis são efetivamente pontuados (três formulados positivamente e três negativamente) e quatro funcionam como distratores, consolidou-se internacionalmente como a medida padrão-ouro para avaliação do otimismo disposicional, sendo amplamente utilizado em contextos clínicos e de investigação sobre saúde física e mental, resiliência psicológica e adaptação a transições desenvolvimentais (Rasmussen, Scheier, & Greenhouse, 2009). Analogamente ao modo como as teorias implícitas de inteligência estudadas por Dweck e Leggett (1988) influenciam os padrões motivacionais dos estudantes, distinguindo entre aqueles que concebem a inteligência como uma entidade fixa versus uma qualidade maleável, O otimismo disposicional reflete uma orientação prospetiva que modula as respostas comportamentais e afetivas perante desafios académicos e transições críticas. Dweck (1986) demonstrou que estudantes com teorias incrementais de inteligência tendem a adotar metas de aprendizagem e a exibir padrões *mastery-oriented* caracterizados por persistência elevada face a dificuldades, enquanto aqueles com teorias entitárias orientam-se para metas de performance e manifestam padrões helpless com maior frequência. De forma paralela, indivíduos com elevado otimismo disposicional empregam estratégias de coping mais adaptativas e focadas no problema, acreditando que as suas ações podem conduzir a resultados favoráveis, ao passo que indivíduos pessimistas tendem ao evitamento e ao desinteresse (Segerstrom & Carver, 2010). Esta convergência conceitual sugere que instrumentos como o LOT-R podem complementar avaliações de mindset em estudos sobre adaptação universitária, capturando uma dimensão de expectativas futuras que, embora relacionada com crenças sobre capacidade, não se sobrepõem totalmente a estas.

Desde a publicação do LOT-R, um debate psicométrico internacional tem persistido relativamente à sua estrutura dimensional. Scheier et al. (1994), no estudo original de validação, testaram através de análise fatorial confirmatória tanto um modelo unifatorial, que concebe otimismo e pessimismo como polos opostos de um único contínuo, quanto um modelo bifatorial, que os trata como fatores distintos, mas correlacionados. Embora os resultados tenham demonstrado que o modelo bifatorial apresentava ajuste ligeiramente superior, os autores optaram pelo modelo unidimensional invocando razões de parcimônia teórica e pragmática, dado que a correlação entre os dois fatores era substancialmente elevada. Esta decisão editorial, contudo, desencadeou décadas de investigação empírica que produziu evidências contraditórias. Estudos conduzidos em contextos culturais diversos como Hong Kong (Lai et al., 1998), Alemanha (Rauch et al., 2007), Canadá (Trottier et al., 2008) e França (Vautier et al., 2003) corroboraram a estrutura unifatorial, enquanto investigações em Espanha (Ferrando et al., 2002), Colômbia (Zenger et al., 2013) e Japão (Nakano, 2004) forneceram suporte empírico robusto para o modelo bifatorial. Marshall et al. (1992), num estudo seminal que antecedeu a própria revisão do LOT, já havia sugerido que a escala original média dois fatores distintos, argumentação que influenciou substancialmente o desenvolvimento do LOT-R. Esta controvérsia não é meramente estatística, possuindo implicações teóricas profundas: um modelo unifatorial sugere que pessimismo representa simplesmente a ausência de otimismo, enquanto um modelo bifatorial permite conceptualizar cenários mais complexos, como indivíduos com níveis baixos de ambos os construtos (indiferença emocional) ou níveis moderados de ambos (ambivalência cognitiva). A questão metodológica da escolha entre análise fatorial exploratória e confirmatória revela-se particularmente relevante neste debate, dado que a AFE pode ser menos sensível para distinguir fatores altamente correlacionados, enquanto a AFC permite testar formalmente hipóteses estruturais concorrentes com maior rigor estatístico (Ribeiro, Pedro, & Marques, 2012).

No contexto português, a validação do LOT-R apresenta precisamente esta dualidade metodológica que caracteriza o panorama internacional. O primeiro grande estudo de adaptação, conduzido por Laranjeira (2008) com uma amostra robusta de 790 estudantes universitários, empregou um processo rigoroso de tradução e retroversão e avaliou as propriedades psicométricas mediante análise fatorial exploratória com rotação ortogonal varimax. A consistência interna obtida foi de α=0,71, valor considerado aceitável e indicador de homogeneidade adequada do questionário, embora ligeiramente inferior ao α=0,78 reportado por Scheier et al. (1994) no estudo original norte-americano. A estrutura de fator único identificada por Laranjeira (2008) explicava 45,87% da variância total, levando o autor a concluir que a versão portuguesa mantinha a dimensionalidade preferida pelos criadores do instrumento. Adicionalmente, o estudo confirmou a validade concorrente através de uma correlação positiva moderada (r=0,48) entre o LOT-R e a Instrumental and Expressive Social Support Scale, demonstrando que níveis mais elevados de otimismo associavam-se a perceções de maior suporte social. Contudo, um estudo subsequente mencionado na literatura brasileira e conduzido por Ribeiro et al. (2012) empregou uma abordagem analítica distinta, aplicando análise fatorial confirmatória em duas amostras de adultos portugueses, uma da população geral e outra composta por pacientes com esclerose múltipla. Ao comparar diretamente o ajuste dos modelos unifatorial e bifatorial, os investigadores concluíram que o segundo apresentava índices de ajuste significativamente superiores em ambas as amostras. Esta discrepância não deve ser interpretada como contradição, mas como reflexo da evolução dos métodos psicométricos: a AFE, embora útil para identificar estruturas latentes, revela-se menos adequada para testar formalmente hipóteses estruturais concorrentes, função para a qual a AFC foi especificamente concebida. No Brasil,

o percurso de validação do LOT-R espelha notavelmente esta trajetória metodológica portuguesa. Bandeira, Bekou, Lott, Teixeira e Rocha (2002) realizaram uma validação transcultural com 396 estudantes universitários, identificando através de AFE com rotação varimax um único fator que explicava 39,78% da variância, com consistência interna de α=0,68. Anos mais tarde, Bastianello, Pacico e Hutz (2014) corroboraram este achado numa amostra mais ampla de 844 universitários, obtendo uma estrutura unidimensional que explicava 51% da variância e α=0,80. Todavia, a aplicação de métodos confirmatórios alterou substancialmente o panorama: Ottati e Noronha (2017), embora trabalhando com uma amostra de 183 crianças e adolescentes do ensino fundamental e médio, testaram formalmente os modelos concorrentes mediante AFC e os resultados alinharam-se com a tendência internacional recente, demonstrando que o modelo bifatorial apresentava índices de ajustamento superiores ao unifatorial.

A relevância de estudos psicométricos sobre otimismo disposicional em populações universitárias adquire particular pertinência quando considerada à luz dos movimentos de renovação pedagógica que, ao longo das últimas décadas, têm enfatizado dimensões sócio-emocionais e motivacionais da aprendizagem. Hernández Díaz (2011, 2018), nos seus trabalhos sobre os movimentos de renovação pedagógica na Península Ibérica durante as décadas de 1980 e 1990, documenta como pedagogias progressistas, incluindo a difusão dos princípios de Freinet, promoveram uma valorização crescente das variáveis afetivo-motivacionais dos estudantes em contraposição a abordagens exclusivamente centradas na transmissão de conteúdos académicos. Este contexto histórico de mudança paradigmática na educação ibérica preparou o terreno cultural e institucional para investigações sistemáticas sobre disposições psicológicas positivas, como o otimismo, enquanto preditores de sucesso académico e bem-estar estudantil. A estrutura institucional das universidades portuguesas, caracterizada por tensões entre autonomia e subordinação que Lima (2014) analisa nos seus estudos sobre gestão democrática e relações de poder no sistema educativo, constitui igualmente um elemento contextual relevante para a compreensão do desenvolvimento de disposições otimistas em estudantes universitários. Lima (s.d.), na sua obra sobre a subordinação de diretores escolares e os limites da autonomia institucional, argumenta que as estruturas de gestão democrática e o grau de autonomia relativa das instituições educativas influenciam significativamente o clima organizacional e, por extensão, o bem-estar dos seus membros.

Transpondo esta análise para o contexto do ensino superior, é plausível que universidades com maior autonomia democrática e estruturas de gestão participativa favoreçam ambientes institucionais que nutrem expectativas positivas e promovem o desenvolvimento de disposições otimistas entre estudantes, embora esta hipótese careça ainda de investigação empírica sistemática. Por outro lado, as políticas educativas portuguesas implementadas desde a década de 1980, analisadas criticamente por Stoer, Stoleroff e Correia (1990) no seu trabalho sobre a lógica da acumulação e o vocacionalismo, revelam uma forte influência de organismos internacionais, particularmente da OCDE, na definição de prioridades educativas centradas na preparação para o mercado de trabalho e na resposta às exigências da economia global. Stoer et al. (1990) argumentam que o Exame da Política Educativa de Portugal pela OCDE em 1984 teve impacto determinante na reorientação do sistema educativo português para objetivos de empregabilidade e formação vocacional, uma tendência que se intensificou com a integração de Portugal na Comunidade Económica Europeia. Neste contexto de políticas educativas influenciadas por racionalidades económicas e de ênfase na transição universidade-mercado de trabalho, a mensuração de variáveis disposicionais como o otimismo adquire relevância acrescida, dado

que o otimismo disposicional tem demonstrado predizer ajustamento ocupacional, resiliência perante adversidades profissionais e capacidade de navegação bem-sucedida em transições de carreira (Rasmussen et al., 2009).

Não obstante a existência de estudos psicométricos sobre o LOT-R em Portugal, persiste uma lacuna significativa na literatura: a ausência de investigações que empreguem análise fatorial exploratória com extração de dois fatores sem rotação em amostras de estudantes universitários, metodologia que, conforme demonstrado por Ribeiro et al. (2012), permite captar adequadamente a correlação entre os fatores de otimismo e pessimismo sem forçar uma estrutura ortogonal artificial. A população universitária constitui um grupo particularmente relevante para estudos sobre otimismo disposicional, dado que a entrada no ensino superior representa uma transição desenvolvimental crítica caracterizada por desafios académicos intensificados, reestruturação de redes sociais, incremento de autonomia e responsabilidade pessoal, e confrontação com incertezas sobre o futuro profissional. Blackwell, Trzesniewski e Dweck (2007), no seu estudo longitudinal sobre teorias implícitas de inteligência e achievement em adolescentes durante a transição para o ensino secundário, demonstraram que períodos de transição escolar constituem momentos particularmente sensíveis para a manifestação de diferenças motivacionais e disposicionais, com estudantes que mantinham teorias incrementais exibindo trajetórias ascendentes de desempenho enquanto aqueles com teorias entitárias manifestavam trajetórias estagnadas ou descendentes. Analogamente, é plausível que o otimismo disposicional exerça influência diferencial sobre a adaptação universitária, a persistência académica e o bem-estar psicológico de estudantes em transição, tornando imperativa a disponibilidade de instrumentos de medida psicometricamente robustos e culturalmente validados.

METODOLOGIA

O presente estudo adotou um delineamento de investigação de levantamento quantitativo, de natureza transversal, visando examinar as propriedades psicométricas do Life Orientation Test-Revised em contexto universitário português. A amostra foi constituída por 934 estudantes universitários recrutados mediante processo de amostragem aleatória em instituições de ensino superior de Portugal, respeitando os princípios de representatividade e aleatoriedade que, conforme argumentado por Scheier et al. (1994) nos seus estudos de validação original do LOT-R, são essenciais para garantir a generalização dos achados psicométricos para a população-alvo. Os participantes apresentavam idades compreendidas entre 17 e 71 anos, com idade média de 21,7 anos (DP=6,38), refletindo a diversidade etária característica do ensino superior português contemporâneo, no qual, segundo análises de políticas educativas conduzidas por Stoer, Stoleroff e Correia (1990), tem-se verificado um aumento progressivo de estudantes não-tradicionais e de retorno à formação académica. A composição da amostra por sexo revelou 62,7% de participantes do sexo feminino, 37,2% do sexo masculino e 0,1% que se identificaram em categoria alternativa, distribuição que, embora não perfeitamente equilibrada, encontra paralelo em estudos internacionais de validação psicométrica como os conduzidos por Bandeira et al. (2002) no Brasil e Laranjeira (2008) em Portugal. Os critérios de inclusão estabelecidos compreenderam a matrícula ativa em curso de graduação ou pós-graduação em instituição de ensino superior portuguesa, maioridade legal para consentimento informado autónomo, e disponibilidade para responder ao questionário eletrônico de forma voluntária e anônima, critérios que visaram assegurar tanto a validade ética quanto a adequação da amostra aos objetivos da investigação.

O instrumento de medida utilizado foi a versão portuguesa do Life Orientation Test-Revised (LOT-R), originalmente desenvolvido por Scheier, Carver e Bridges (1994) e adaptado para o contexto português por Laranjeira (2008) mediante processo rigoroso de tradução e retroversão que garantiu a equivalência semântica e conceitual dos itens. O LOT-R constitui uma escala breve de autorrelato composta por 10 itens, dos quais seis são efetivamente pontuados para avaliação do otimismo disposicional (três formulados positivamente e três negativamente) e quatro funcionam como itens distratores ou filler items, desenhados para mascarar o propósito da medida e reduzir vieses de desejabilidade social (Scheier et al., 1994). Os três itens que avaliam diretamente o otimismo incluem afirmações como "Sou sempre otimista relativamente ao futuro" (item 4), "Em situações difíceis espero sempre o melhor" (item 1) e "No conjunto, espero que me aconteçam mais coisas boas do que más" (item 10), enquanto os três itens que avaliam pessimismo compreendem enunciados como "Se alguma coisa de errado tiver de acontecer comigo, acontecerá de certeza" (item 3), "Quase nunca espero que as coisas corram a meu favor" (item 7) e "Raramente espero que as coisas boas me aconteçam" (item 9). Os quatro itens distratores abordam temáticas não relacionadas com expectativas futuras, como "Para mim é fácil relaxar" (item 2) e "Eu gosto muito dos meus amigos" (item 5), não sendo computados na pontuação final. Os participantes responderam a cada item utilizando uma escala de Likert de cinco níveis. Para os itens de otimismo, a pontuação variou de 0 (discordo totalmente) a 4 (concordo totalmente); para os itens de pessimismo, de 0 (concordo totalmente) a 4 (discordo totalmente). Aos itens distratores foi atribuída pontuação zero, formato que difere ligeiramente da escala de seis pontos utilizada no instrumento original norte-americano mas que tem sido amplamente empregado em validações europeias e lusófonas (Ribeiro et al., 2012). O processo de pontuação do LOT-R requer a soma aritmética da pontuação dos seis itens válidos, gerando uma pontuação total que varia de 0 a 24 pontos. A interpretação desta pontuação segue critérios convencionados na literatura: valores entre 0 e 13 pontos indicam baixo otimismo e alto pessimismo, pontuações entre 14 e 18 pontos refletem otimismo moderado, e valores entre 19 e 24 pontos correspondem a alto otimismo e baixo pessimismo (Scheier et al., 1994).

A recolha de dados foi realizada mediante questionário eletrônico estruturado, disseminado digitalmente através de plataformas online de survey junto de estudantes universitários portugueses, método que, conforme demonstrado em estudos psicométricos contemporâneos como os de Bastianello et al. (2014), oferece vantagens de alcance geográfico ampliado, redução de custos, facilidade de processamento de dados e possibilidade de aleatorização de itens para controlo de efeitos de ordem. O protocolo de investigação foi submetido e aprovado por comitê de ética em investigação, assegurando conformidade com os princípios éticos estabelecidos na Declaração de Helsínquia e com as normas de proteção de dados pessoais vigentes em Portugal e na União Europeia. Todos os participantes foram informados sobre os objetivos gerais do estudo, a natureza voluntária da sua participação, o direito de retirada sem penalizações, e as garantias de anonimato e confidencialidade dos dados recolhidos, tendo manifestado consentimento informado através de cláusula específica no questionário eletrónico. A duração média de preenchimento do questionário foi aproximadamente de dez minutos, minimizando o risco de fadiga e respostas descuidadas que poderiam comprometer a qualidade dos dados, problema identificado por Laranjeira (2008) em contextos de aplicação de múltiplos instrumentos simultaneamente.

A análise de dados foi conduzida mediante procedimentos estatísticos apropriados para avaliação de propriedades psicométricas de instrumentos de medida. Para as análises,

foram considerados apenas os itens de otimismo e de pessimismo, uma vez que os itens distratores receberam pontuação zero. Preliminarmente, calcularam-se estatísticas descritivas (média, desvio-padrão, valores mínimo e máximo) para a pontuação total do LOT-R e para cada um dos seis itens válidos, permitindo caracterizar a distribuição das respostas na amostra. A adequação da matriz de correlações à análise fatorial foi avaliada através de dois índices complementares: o índice Kaiser-Meyer-Olkin (KMO), que quantifica a proporção de variância comum entre os itens e cujos valores superiores a 0,60 são considerados aceitáveis para prosseguir com análise fatorial (Kaiser, 1974), e o Teste de Esfericidade de Bartlett, que testa a hipótese nula de que a matriz de correlações é uma matriz identidade, sendo que valores significativos ($p<0,05$) indicam que existem correlações suficientes entre os itens para justificar a extração de fatores (Ribeiro et al., 2012).

A consistência interna da escala foi estimada através do coeficiente alfa de Cronbach, medida de fidedignidade amplamente empregada em estudos psicométricos que quantifica a homogeneidade dos itens, sendo que valores superiores a 0,70 são geralmente considerados adequados para escalas de personalidade, embora valores ligeiramente inferiores ($\alpha \geq 0,60$) sejam aceitáveis para escalas breves com seis ou menos itens (Scheier et al., 1994; Laranjeira, 2008). Para determinar a estrutura dimensional do LOT-R, procedeu-se à análise fatorial exploratória (AFE) com extração forçada de dois fatores sem rotação, metodologia que, ao contrário da rotação ortogonal varimax empregada por Laranjeira (2008), permite que os fatores extraídos se correlacionem, capturando assim de forma mais adequada a relação conceptual entre otimismo e pessimismo postulada por Ribeiro et al. (2012) no seu estudo confirmatório. O critério de retenção de itens estabeleceu cargas fatoriais mínimas de 0,30 em valor absoluto, limiar convencional em estudos psicométricos que equilibra inclusividade e clareza interpretativa dos fatores (Bastianello et al., 2014).

RESULTADOS

A análise descritiva das pontuações totais do Life Orientation Test-Revised na amostra de 934 estudantes universitários portugueses revelou uma média de 13,87 pontos (DP=4,27), com amplitude de variação entre 1 e 24 pontos, valores que se situam ligeiramente acima do ponto médio teórico da escala (12 pontos numa amplitude de 0-24) e que indicam uma tendência geral para níveis moderados de otimismo disposicional nesta população. A análise dos quartis revelou que 25% dos participantes obtiveram pontuações inferiores a 11 pontos (primeiro quartil) e 25% superiores a 17 pontos (terceiro quartil), evidenciando dispersão considerável na distribuição do otimismo disposicional. A distribuição da amostra segundo os critérios interpretativos estabelecidos por Scheier, Carver e Bridges (1994) demonstrou que 55,6% dos participantes apresentavam baixo otimismo (pontuação≤13), 36,8% evidenciavam otimismo moderado (pontuação entre 14-18) e apenas 7,6% manifestavam alto otimismo (pontuação≥19), padrão distributivo que sugere que a maioria dos estudantes universitários portugueses desta amostra mantinha expectativas futuras relativamente pessimistas ou ambivalentes, achado que contrasta com estudos norte-americanos nos quais predominam níveis moderados a elevados de otimismo (Scheier et al., 1994) mas que encontra paralelo em investigações conduzidas em contextos de transição educativa crítica, como o estudo de Blackwell, Trzesniewski e Dweck (2007) sobre adolescentes na entrada do ensino secundário.

A análise item-a-item dos seis itens válidos do LOT-R revelou que o item 10 ("No conjunto, espero que me aconteçam mais coisas boas do que más") obteve a média mais elevada (M=3,03; DP=0,98), indicando que, apesar de níveis globais moderados de otimismo, os estudantes mantinham uma expectativa geral positiva sobre o balanço futuro de eventos.

Inversamente, o item 3 ("Se alguma coisa de errado tiver de acontecer comigo, acontecerá de certeza") apresentou a média mais baixa após inversão (M=1,73; DP=1,12), sugerindo que os participantes tendiam a discordar desta afirmação pessimista determinística, embora a elevada dispersão de respostas indicasse heterogeneidade substancial na amostra. Os três itens formulados positivamente (otimismo direto) apresentaram médias entre 2,24 e 3,03 e desvios-padrão relativamente menores (DP entre 0,98 e 1,22), enquanto os três itens formulados negativamente (pessimismo) exibiram médias entre 1,73 e 2,27 após inversão e desvios-padrão entre 1,12 e 1,18, padrão que sugere maior variabilidade individual nas cognições pessimistas do que nas otimistas e que suporta a conceptualização bifatorial defendida por Marshall et al. (1992) e Ribeiro, Pedro e Marques (2012).

A avaliação da consistência interna do LOT-R mediante o coeficiente alfa de Cronbach resultou num valor de α=0,68 para a escala total de seis itens, índice considerado adequado para escalas breves de personalidade segundo os critérios estabelecidos por Scheier et al. (1994) e que se revela convergente com os valores reportados em estudos de validação prévios em Portugal (Laranjeira, 2008: α=0,71) e no Brasil (Bandeira et al., 2002: α=0,68), embora ligeiramente inferior ao obtido por Bastianello, Pacico e Hutz (2014) numa amostra brasileira mais ampla (α=0,80). Este nível de consistência interna, conquanto adequado, reflete a brevidade do instrumento e a sua estrutura conceptual que engloba itens formulados bidirecionalmente, fatores que, conforme argumentado por Laranjeira (2008), tendem a produzir alfas moderados em vez de elevados mas que não comprometem a utilidade psicométrica da escala. A adequação da matriz de correlações à análise fatorial foi confirmada pelo índice Kaiser-Meyer-Olkin (KMO=0,70), valor considerado adequado segundo os critérios de Kaiser (1974) mas que autoriza o prosseguimento com a extração de fatores, e pelo Teste de Esfericidade de Bartlett (χ^2=1034,63; gl não especificado; p<0,0001), resultado altamente significativo que rejeita a hipótese nula de matriz identidade e confirma a existência de correlações substanciais entre os itens do LOT-R, justificando assim a pertinência da análise fatorial exploratória (Ribeiro et al., 2012).

Foi utilizado estrutura de dois fatores sem rotação utilizando o software SPSS versão 30. Os Resultados com o percentual de variância explicada por cada uns dos fatores estão apresentados na Tabela 1 e os resultados dos pesos dos fatores para os itens de otimismo e pessimismo estão apresentados na Tabela 2.

Tabela 1 – *Variância total explicada pelos fatores*

Componentes	Total	% de Variância	% de Variância Acumulada
Fator 1	2,35	39,18	39,18
Fator 2	1,26	20,94	60,12
Fator 3	0,79	13,15	73,27
Fator 4	0,71	11,80	85,07
Fator 5	0,49	8,08	93,15
Fator 6	0,41	6,85	100,00

Fonte: Dados da Pesquisa - 2025

Tabela 2 - *Cargas dos Fatores – Análise Fatorial sem rotação*

Itens	Fator 1	Fator 2
1 - Em situações difíceis espero sempre o melhor	0,609	0,496
4 - Sou sempre otimista relativamente ao futuro	0,703	0,404
10 - No conjunto, espero que me aconteçam mais coisas boas do que más	0,456	0,455
3 - Se alguma coisa de errado tiver de acontecer comigo, acontecerá de certeza	0,430	-0,620
7 - Quase nunca espero que as coisas corram a meu favor	0,742	-0,400

9 - Raramente espero que as coisas boas me aconteçam	0,737	-0,312
Variância explicada	2,351	1,256
Percentual da variância explicada	39,18%	20,94%

Fonte: Dados da Pesquisa - 2025

A análise fatorial exploratória com extração forçada de dois fatores sem rotação, metodologia que permite captar a correlação natural entre os fatores ao contrário da rotação ortogonal empregada por Laranjeira (2008), revelou uma estrutura bifatorial que explicou 60,12% da variância total dos dados.

O Fator 1, interpretado como uma dimensão geral de Otimismo, explicou 39,18% da variabilidade total e apresentou cargas fatoriais positivas elevadas em todos os seis itens válidos, com os três itens de otimismo direto exibindo cargas entre 0,456 e 0,703 (item 4: 0,703; item 1: 0,609; item 10: 0,456) e os três itens de pessimismo invertido apresentando cargas igualmente substanciais entre 0,430 e 0,742 (item 7: 0,742; item 9: 0,737; item 3: 0,430). O Fator 2, interpretado como uma dimensão de diferenciação entre Otimismo e Não-pessimismo, contribuiu com variância adicional e revelou um padrão discriminante característico: os itens de otimismo direto apresentaram cargas fatoriais positivas moderadas (item 10: 0,455; item 1: 0,496; item 4: 0,404), enquanto os itens de pessimismo exibiram cargas negativas (item 3: -0,620; item 7: -0,400; item 9: -0,312), configuração que suporta empiricamente a distinção conceptual entre otimismo enquanto expectativas positivas e pessimismo enquanto expectativas negativas, construtos relacionados mas não redutíveis a polos opostos de um único contínuo, conforme argumentado teoricamente por Marshall et al. (1992) e demonstrado empiricamente em contexto português por Ribeiro et al. (2012) mediante análise fatorial confirmatória. Esta estrutura bifatorial com variância explicada conjunta de 60,12% supera substancialmente os valores reportados em estudos unidimensionais prévios, incluindo os 45,87% de Laranjeira (2008) em Portugal e os 39,78% de Bandeira et al. (2002) no Brasil, sugerindo que a extração de dois fatores sem rotação captura de forma mais completa a complexidade estrutural do construto otimismo disposicional tal como operacionalizado pelo LOT-R.

Os resultados do presente estudo confirmam que a versão portuguesa do Life Orientation Test-Revised apresenta propriedades psicométricas adequadas para utilização em populações universitárias, fornecendo evidências empíricas robustas que contribuem para a resolução do debate internacional sobre a estrutura dimensional do instrumento. A consistência interna obtida (α=0,68) situa-se em alinhamento preciso com os achados de Bandeira, Bekou, Lott, Teixeira e Rocha (2002) no Brasil (α=0,68) e aproxima-se dos valores reportados por Laranjeira (2008) em Portugal (α=0,71), embora permaneça aquém do coeficiente mais elevado documentado por Bastianello, Pacico e Hutz (2014) numa amostra brasileira ampliada (α=0,80). Esta convergência transnacional de valores de alfa moderados para o LOT-R, conforme argumentado por Scheier, Carver e Bridges (1994) no estudo original de validação, reflete não uma deficiência psicométrica mas antes a brevidade intencional do instrumento e a sua estrutura conceptual que incorpora itens bidirecionais, características que inevitavelmente produzem coeficientes de consistência interna mais modestos do que escalas extensas e unidirecionais mas que não comprometem a sua validade enquanto medida de otimismo disposicional. A estrutura bifatorial identificada mediante análise fatorial exploratória, com os dois fatores explicando conjuntamente 60,12% da variância total (Fator 1: 39,18%); (Fator 2: 20,94%), supera substancialmente a variância explicada em estudos unidimensionais prévios, incluindo os 45,87% de Laranjeira (2008), os 39,78% de Bandeira et al. (2002) e os 51% de Bastianello et al. (2014), demonstrando empiricamente que a extração de dois fatores sem rotação captura dimensões latentes adicionais que

permanecem ocultas quando se força uma solução unifatorial. Este achado possui implicações teóricas profundas para a conceptualização do otimismo disposicional enquanto construto psicológico.

A reconciliação do debate dimensional entre perspectivas unifatoriais e bifatoriais do LOT-R beneficia-se substancialmente dos resultados aqui apresentados. A solução bifatorial obtida corrobora inequivocamente os achados de Ribeiro, Pedro e Marques (2012), que mediante análise fatorial confirmatória em amostras portuguesas clínicas e gerais demonstraram superioridade estatística do modelo de dois fatores, e alinha-se igualmente com a vertente internacional de estudos que suportam a bifatorialidade, incluindo as investigações conduzidas por Marshall et al. (1992), que originalmente questionaram a unidimensionalidade assumida no LOT, e por Ferrando, Chico e Tous (2002) em Espanha, Zenger et al. (2013) na Colômbia e Nakano (2004) no Japão. A divergência face aos resultados unidimensionais de Laranjeira (2008) pode ser atribuída primariamente a diferenças metodológicas substantivas: enquanto Laranjeira empregou análise fatorial exploratória com rotação ortogonal varimax, procedimento que força independência matemática entre factores e que, conforme argumentado por Ribeiro et al. (2012), pode obscurecer correlações naturais entre dimensões conceptualmente relacionadas, o presente estudo utilizou extração de dois fatores sem rotação, metodologia que preserva a estrutura correlacional original dos dados e permite que otimismo e pessimismo emerjam como construtos distintos mas relacionados. Este refinamento metodológico não invalida a teoria original de Scheier et al. (1994), mas antes a sofística: otimismo e pessimismo, conquanto altamente correlacionados, não constituem meramente pólos opostos de um único contínuo mas representam dimensões parcialmente independentes que podem coexistir em configurações complexas, permitindo estados psicológicos de ambivalência (níveis moderados de ambos) ou indiferença (níveis baixos de ambos) que um modelo estritamente unipolar não consegue capturar adequadamente. A estrutura do Fator 2, com cargas positivas nos itens de otimismo e cargas negativas nos itens de pessimismo, revela precisamente esta diferenciação, sugerindo que a avaliação de expectativas futuras positivas não equivale simplesmente à ausência de expectativas negativas, mas constitui um processo cognitivo parcialmente autónomo, implicação que ressoa com modelos duais de afeto positivo e negativo desenvolvidos na literatura de emoções e que tem consequências práticas para intervenções psicológicas destinadas a promover bem-estar.

A integração teórica entre o otimismo disposicional medido pelo LOT-R e outros construtos motivacionais relevantes para contextos educacionais revela-se particularmente frutífera. O paralelismo conceitual entre otimismo enquanto expectativa de resultados futuros positivos e as teorias implícitas de inteligência estudadas por Dweck e Leggett (1988) merece atenção aprofundada: ambos os construtos envolvem sistemas de crenças relativamente estáveis sobre a maleabilidade versus fixidez de características pessoais, sendo que as teorias incrementais de inteligência postulam que a capacidade cognitiva é desenvolvível através de esforço, enquanto o otimismo disposicional postula que resultados positivos são alcançáveis mediante persistência e estratégias adaptativas. Dweck (1986), nos seus estudos seminais sobre padrões motivacionais adaptativos versus mal adaptativos, demonstrou que estudantes com teorias incrementais manifestam orientação para metas de aprendizagem, persistência elevada face a obstáculos e atribuições de fracasso centradas no esforço insuficiente ou estratégias inadequadas, padrão mastery-oriented que facilita o desenvolvimento de competências e prediz trajetórias ascendentes de achievement. Analogamente, Segerstrom e Carver (2010), na sua revisão sobre otimismo e saúde, documentam que indivíduos otimistas empregam predominantemente estratégias de

coping focadas no problema, acreditam na eficácia das suas ações para alterar situações adversas e persistem face a dificuldades, exibindo assim um perfil comportamental notavelmente convergente com o padrão mastery-oriented descrito por Dweck. O estudo longitudinal de Blackwell, Trzesniewski e Dweck (2007), que acompanhou adolescentes durante a transição crítica para o ensino secundário, demonstrou que aqueles com teorias incrementais de inteligência apresentavam trajetórias ascendentes de notas em matemática ao longo de dois anos, enquanto estudantes com teorias entitárias exibiam trajetórias estagnadas, mesmo quando grupos não diferiam em capacidade cognitiva inicial.

Transpondo esta lógica para o otimismo disposicional, é plausível que estudantes universitários com elevado otimismo naveguem mais eficazmente a transição para o ensino superior, mantendo persistência académica e bem-estar psicológico face aos desafios intensificados nesta etapa desenvolvimental, hipótese que justifica a integração de medidas de otimismo (LOT-R) e de teorias de inteligência (escalas de Dweck) em modelos preditivos compreensivos de sucesso universitário. Importa reconhecer, todavia, que estes construtos não são inteiramente sobreponíveis: o otimismo centra-se em expectativas de resultados, enquanto as teorias de inteligência focam-se em crenças sobre capacidade, distinção que sugere contribuições únicas e complementares para a explicação de variância em outcomes académicos e que merece investigação empírica sistemática futura.

Considerações Finais

A contextualização histórica e institucional dos achados sobre otimismo em estudantes universitários portugueses beneficia-se da consideração de transformações pedagógicas e políticas que caracterizaram o sistema educativo ibérico nas últimas décadas. Os movimentos de renovação pedagógica analisados por Hernández Díaz (2018), particularmente a difusão de pedagogias progressistas como a de Freinet em Espanha durante as décadas de 1980 e 1990, promoveram uma reorientação paradigmática que valorizou dimensões sócio-emocionais e motivacionais dos estudantes em contraposição a abordagens tradicionais exclusivamente centradas na transmissão de conteúdos disciplinares. Esta mudança, que em Portugal se intensificou particularmente após a revolução de 1974 e as subsequentes reformas educativas democratizantes, preparou o terreno institucional e cultural para que variáveis disposicionais positivas, como o otimismo, fossem reconhecidas enquanto preditores legítimos de sucesso educativo e não meramente como epifenômenos de capacidade cognitiva. A relevância deste enquadramento histórico reside no facto de que a mensuração psicométrica rigorosa de construtos como o otimismo só se torna prioritária em sistemas educativos que conceptualizam a formação integral do estudante, incluindo as suas dimensões afetivo-motivacionais, como objetivo legítimo da educação formal.

Por outro lado, a estrutura de gestão das instituições universitárias portuguesas, analisada criticamente por Lima (2014; s.d.) nos seus trabalhos sobre gestão democrática, autonomia institucional e relações de poder no sistema educativo, constitui um elemento contextual relevante para a compreensão do desenvolvimento de disposições otimistas em estudantes. Lima argumenta que as tensões entre autonomia institucional e subordinação a instâncias centralizadas, entre gestão democrática participativa e controle burocrático hierárquico, moldam profundamente os climas organizacionais das instituições educativas e, por extensão, a experiência subjetiva dos seus membros. Transpondo esta análise para o ensino superior, é teoricamente plausível que universidades caracterizadas por maior autonomia democrática, participação estudantil em processos decisórios e flexibilidade curricular favoreçam o desenvolvimento de expectativas futuras positivas entre estudantes, ao

proporcionarem ambientes institucionais nos quais a agência individual é valorizada e os estudantes percepcionam que as suas ações podem efetivamente influenciar os seus percursos académicos. Inversamente, instituições marcadas por rigidez burocrática, ausência de participação estudantil e subordinação a lógicas puramente administrativas poderiam, segundo esta hipótese, constituir ambientes menos propícios ao desenvolvimento de otimismo disposicional, embora esta relação entre características institucionais e disposições psicológicas estudantis permaneça essencialmente inexplorada empiricamente e constitua uma direção promissora para investigações futuras que articulem análises organizacionais ao nível meso (estruturas institucionais) com análises psicológicas ao nível micro (disposições individuais).

As políticas educativas portuguesas implementadas desde a década de 1980, analisadas por Stoer, Stoleroff e Correia (1990) na sua obra sobre vocacionalismo e lógica de acumulação, fornecem um enquadramento macro-estrutural adicional para interpretar a relevância da mensuração de otimismo disposicional em populações universitárias. Stoer et al. (1990) documentam como a intervenção de organismos internacionais, particularmente da Organização para a Cooperação e Desenvolvimento Econômico, influenciou decisivamente a reorientação do sistema educativo português para objectivos de empregabilidade, formação vocacional e preparação para o mercado de trabalho, tendência intensificada com a integração de Portugal na Comunidade Económica Europeia. O Exame da Política Educativa de Portugal pela OCDE em 1984, segundo Stoer et al.(1990), teve impacto paradigmático ao legitimar discursos que subordinavam a educação a racionalidades económicas produtivistas e que enfatizavam a necessidade de adequar competências estudantis às supostas necessidades do tecido empresarial, lógica que o próprio Ministro da Educação José Augusto Seabra acolheu entusiasticamente sem aparente reflexão crítica sobre os interesses específicos que subjazem a tais recomendações. Nesse contexto de políticas educativas crescentemente orientadas para a transição educação-emprego e para a inserção no mercado de trabalho, a mensuração de variáveis disposicionais como o otimismo adquire pertinência acrescida, dado que o otimismo disposicional tem demonstrado predizer ajustamento ocupacional, resiliência perante adversidades profissionais, capacidade de enfrentamento de transições de carreira e até indicadores objectivos de sucesso laboral como progressão salarial e estabilidade de emprego, conforme meta-análise conduzida por Rasmussen, Scheier e Greenhouse (2009).

Assim, num sistema de ensino superior concebido crescentemente como preparação para o mercado de trabalho, conforme a lógica vocacionalista analisada por Stoer et al. (1990), a avaliação psicométrica de otimismo mediante instrumentos validados como o LOT-R torna-se relevante não apenas para estudos de bem-estar estudantil mas igualmente para investigações sobre preparação para transições profissionais, empregabilidade percepcionada e capacidade de navegação dos desafios característicos de mercados de trabalho contemporâneos marcados por precariedade e incerteza, embora seja imperativo que tal mensuração não se reduza a uma instrumentalização do bem-estar psicológico ao serviço de lógicas económicas produtivistas mas preserve uma preocupação genuína com a qualidade de vida e a realização pessoal dos estudantes enquanto fins em si mesmos e não meramente enquanto meios para eficiência económica.

LIMITAÇÕES

O presente estudo apresenta limitações que devem ser reconhecidas e que circunscrevem a generalização dos achados. Primeiramente, conquanto a amostra de 934 participantes seja substancial e tenha sido recrutada mediante processo aleatório, trata-se de uma amostra

de conveniência restrita ao contexto universitário português, não permitindo generalizações para populações não-universitárias ou para contextos culturais distintos, problema que afecta igualmente os estudos de Laranjeira (2008) e Bandeira et al. (2002). Segundamente, o presente estudo empregou exclusivamente análise fatorial exploratória, não procedendo à análise fatorial confirmatória que, conforme demonstrado por Ribeiro et al. (2012) e Ottati e Noronha (2017), constitui o método estatisticamente mais rigoroso para testar formalmente hipóteses sobre estruturas dimensionais concorrentes. Estudos futuros deverão empregar AFC para testar directamente o ajuste dos modelos unifatorial e bifatorial aos dados portugueses, idealmente mediante abordagem multigrupo que permita avaliar invariância factorial entre subgrupos definidos por sexo, área de estudo ou contexto institucional. Terceiramente, o índice Kaiser-Meyer-Olkin obtido (KMO=0,70) situa-se no limiar inferior da categoria aceitável, sugerindo que amostras ainda mais amplas poderiam fortalecer a adequação da matriz de correlações e estabilizar as cargas fatoriais estimadas. Quartamente, o estudo não avaliou validade convergente nem discriminante do LOT-R mediante correlações com outros construtos psicológicos relevantes, lacuna que impede conclusões sobre se o otimismo medido pelo instrumento se distingue adequadamente de neuroticismo, ansiedade-traço ou, relevantemente, das teorias implícitas de inteligência de Dweck, limitação que estudos subsequentes deverão corrigir através da administração simultânea de múltiplos instrumentos e análise de padrões correlacionais. Quintamente, o delineamento transversal adotado impossibilita inferências sobre estabilidade temporal do otimismo disposicional e sobre trajectórias desenvolvimentais ao longo da experiência universitária, questões que exigiram desenhos longitudinais como o empregado por Blackwell et al. (2007) no estudo de teorias de inteligência.

FUTURAS INVESTIGAÇÕES

As direções futuras para investigação neste domínio são múltiplas e promissoras. Estudos longitudinais que acompanhem coortes de estudantes universitários desde a entrada no ensino superior até à graduação permitiriam examinar trajectórias de otimismo disposicional ao longo do tempo, testar se níveis iniciais de otimismo predizem persistência académica, sucesso curricular e bem-estar psicológico em momentos subsequentes, e avaliar se eventos críticos como fracassos académicos, transições de ciclo ou estágios profissionais alteram níveis de otimismo, análises inspiradas no desenho longitudinal de Blackwell et al. (2007) mas aplicadas especificamente ao contexto universitário. A integração do LOT-R com medidas de teorias implícitas de inteligência (Dweck, 1999), de metas de realização (Dweck & Elliott, 1983) e de estratégias de coping em modelos estruturais ou de trajectória permitiria testar formalmente se estes construtos motivacionais possuem efeitos independentes, mediados ou interactivos sobre outcomes académicos, esclarecendo assim a sua utilidade diferencial e complementar. Análises multigrupo de invariância factorial do LOT-R segundo sexo, área disciplinar (ciências versus humanidades) e tipo de instituição (universidades versus politécnicos) testariam se a estrutura bifatorial identificada se replica consistentemente através de subgrupos ou se existem especificidades que exigem interpretações qualificadas.

A investigação de preditores institucionais do otimismo estudantil, mediante desenhos multinível que articulem variáveis do nível individual (características demográficas e psicológicas) com variáveis do nível institucional (grau de autonomia universitária segundo análise de Lima, recursos de apoio estudantil, modelos de gestão democrática), permitiria testar empiricamente a hipótese de que características organizacionais das universidades influenciam disposições psicológicas dos estudantes. Finalmente, estudos de intervenção que testem se programas destinados a promover otimismo disposicional, eventualmente

mediante técnicas de reestruturação cognitiva ou treino de atribuições optimistas, produzem melhorias mensuráveis em adaptação universitária e bem-estar estudantil, contribuíram para a translação de conhecimento psicométrico em aplicações práticas com benefício tangível para populações universitárias.

Desta forma, o presente estudo demonstra que a versão portuguesa do Life Orientation Test-Revised constitui um instrumento psicometricamente robusto e conceptualmente válido para avaliação do otimismo disposicional em estudantes universitários, apresentando consistência interna adequada (α=0,68), adequação satisfatória à análise factorial (KMO=0,70; Bartlett p<0,0001) e estrutura bifatorial com variância explicada substancial (60,12%) que supera soluções unidimensionais prévias. A identificação de dois fatores interpretados como Otimismo geral e diferenciação Otimismo/Não-pessimismo alinha-se com a vertente internacional de estudos que suportam a bifatorialidade do construto (Marshall et al., 1992; Ribeiro et al., 2012; Ferrando et al., 2002) e refina a teoria original de Scheier et al. (1994) ao demonstrar que expectativas positivas e negativas sobre o futuro, conquanto correlacionadas, constituem dimensões parcialmente independentes. Este achado possui implicações práticas para a avaliação clínica e para o desenho de intervenções, sugerindo que programas de promoção de bem-estar deverão abordar não apenas a redução de pessimismo, mas igualmente o fortalecimento ativo de expectativas positivas.

A convergência conceitual entre otimismo disposicional e teorias implícitas de inteligência de Dweck, particularmente no que concerne aos seus efeitos sobre persistência face a desafios e estratégias adaptativas de enfrentamento, sugere que investigações futuras integrem estes construtos em modelos compreensivos de adaptação universitária. A contextualização dos achados face a transformações pedagógicas históricas (movimentos de renovação analisados por Hernández Díaz), estruturas de gestão institucional (autonomia universitária segundo Lima) e políticas educativas macro-estruturais (vocacionalismo segundo Stoer et al.) sublinha que a mensuração psicológica individual não pode ser divorciada dos contextos institucionais e políticos que moldam as experiências educativas. O LOT-R apresenta-se, assim, como ferramenta útil e teoricamente fundamentada para investigações sobre bem-estar estudantil, resiliência psicológica, transições acadêmicas e inserção profissional em populações universitárias portuguesas, contribuindo para o avanço científico na intersecção entre Psicologia Positiva, Psicologia da Educação e estudos de ensino superior, domínios nos quais a compreensão rigorosa de variáveis disposicionais positivas permanece imperativa para o desenvolvimento de práticas educativas que promovam não apenas excellence académica mas igualmente florescimento humano integral.

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The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

Data supporting the findings of this study are available upon reasonable request.

ETHICS STATEMENT

This study involved human participants. Ethical approval was obtained from the appropriate Research Ethics Committee before data collection. Participation was voluntary and anonymous, and informed consent was obtained from all participants prior to completing the questionnaire. The study was conducted in accordance with the principles of the Declaration of Helsinki and applicable data protection regulations.

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Entrepreneurial Intention of University Students in Paraguay

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Abstract

This study aims to understand the university entrepreneurial ecosystem in Paraguay by identifying institutional, psychological, and contextual factors that influence students' entrepreneurial intention. A quantitative cross-sectional approach was used, employing the GUESSS survey along with confirmatory factor analysis and structural equation modelling to validate an integrative model explaining the determinants of entrepreneurial intention. Key findings show that entrepreneurial self-efficacy is the strongest direct predictor of entrepreneurial intention ($R^2 = 0.162$), while resilience and external learning positively impact self-efficacy and subjective well-being, which in turn influence entrepreneurial intention. The university environment enhances subjective well-being, although well-being showed a marginally negative relationship with entrepreneurial intention. The entrepreneurial activation construct demonstrated low reliability and required refinement. In conclusion, the validated model offers an integrated view of Paraguay's entrepreneurial ecosystem, highlighting the need to strengthen psychological competencies and the university environment to foster entrepreneurial intention, and provides a foundation for designing contextualized and sustainable educational policies and programs.

Keywords: Entrepreneurial intention, self-efficacy, resilience, university ecosystem, Paraguay, GUESSS, subjective well-being.

Introduction

In recent decades, promoting entrepreneurship has established itself as a strategic pillar for economic and social development, especially in developing countries facing structural challenges in youth employment, innovation, and productive diversification (Armstrong & Grobbelaar, 2023; Kamaludin, Xavier, & Amin, 2024). In this context, universities have assumed an active role not only as generators of knowledge, but also as catalysts for skills, attitudes, and networks that facilitate the creation of dynamic and sustainable businesses. Therefore, university entrepreneurship is emerging as a phenomenon of growing academic, political, and economic interest, given its ability to mobilize talent, transform ideas into innovative solutions, and contribute to national competitiveness (Blanco et al., 2024).

Numerous studies have explored the determinants of entrepreneurial intention in university students, mainly based on theoretical models such as the Theory of Planned Behavior (TPB) and the Shapero and Sokol model, which highlight the role of attitudinal, social, and self-efficacy factors in the predisposition to undertake (López et al., 2024; Usman et al., 2024). Recent research has also incorporated contextual variables, such as entrepreneurial training, institutional environment, previous experiences, and family influence, highlighting the

multifactorial complexity of the phenomenon (Leiva et al., 2023; Van der Linde et al., 2024). Among the most recognized tools to study these aspects is the Global University Entrepreneurial Spirit Students' Survey (GUESSS), which has generated comparative evidence in more than 50 countries on the factors that drive or inhibit university youth entrepreneurship (Jerônimo Soares & de Melo, 2024).

However, most of these studies have been conducted in European, Asian, or highly developed economies, with limited representation of Latin American countries and a limited focus on Paraguay. Despite the growing interest in entrepreneurship in Paraguayan educational policy and the inclusion of related subjects in university curricula, significant gaps persist in the systematic evaluation of the impact of these initiatives and in the understanding of the factors that shape entrepreneurial intentions in Paraguayan students. This gap is particularly relevant given the need to promote youth employability, territorial innovation, and economic formalization in Paraguay (Maldonado et al., 2024; Salinas & Ortiz, 2024).

Within this framework, the main objective of this study is to analyse the determinants of entrepreneurial intentions in Paraguayan university students based on the application of the GUESSS survey. The aim is to identify how individual factors (attitudes, self-efficacy, personality), familial factors (entrepreneurial background), institutional factors (university support and climate), and experiential factors (previous activities) influence the willingness to start one's own business. In addition, potential differences based on gender, field of study, and type of institution (public or private) are explored.

This study is expected to contribute significantly to the literature on youth entrepreneurship in Latin American contexts by offering up-to-date and methodologically rigorous empirical data on a country underrepresented in global comparative analyses. From a theoretical perspective, it will allow for the comparison of traditional explanatory models with evidence from a particular institutional and cultural environment. In practical terms, it will provide valuable input for universities, policymakers, and stakeholders in the entrepreneurial ecosystem interested in designing effective strategies to promote entrepreneurship in Paraguay.

The article is structured as follows: the first section develops the theoretical framework, addressing key concepts, explanatory models, and relevant findings on university entrepreneurial intentions, with an emphasis on individual, familial, and institutional factors. The second describes the methodological framework, including design, sample, instruments, and analytical techniques. The third presents the results, the fourth discusses their theoretical and practical implications, and finally, the conclusions, limitations, and future lines of research are presented.

2. LITERATURE REVIEW

2.1. ENTREPRENEURIAL INTENTION AS A FIELD OF STUDY

Entrepreneurial intention is broadly recognized as the conscious and planned desire or motivation of an individual to start a new business venture within a foreseeable future timeframe. This construct is considered a fundamental antecedent to actual entrepreneurial behaviour, serving as a critical cognitive step that precedes the complex process of venture creation (Krueger et al., 2000). Studying entrepreneurial intention provides insights into how individuals decide to pursue entrepreneurship, which is vital for designing effective interventions aimed at fostering entrepreneurial activity at early stages, particularly within university populations where career trajectories are still forming.

The Theory of Planned Behaviour (TPB), introduced by Ajzen (1991), remains the most influential theoretical framework explaining entrepreneurial intention. According to TPB, intention is shaped by three core components:

- Attitude toward entrepreneurship: This refers to the individual's overall positive or negative evaluation of starting a business, shaped by expected outcomes and values assigned to entrepreneurship.
- Subjective norm: This dimension captures the perceived social pressure or support from significant others such as family, peers, mentors, or academic staff, which influences the decision to engage in entrepreneurial activities.
- Perceived behavioural control**:** Often analogous to self-efficacy, this reflects the individual's perception of their capability to successfully perform entrepreneurial actions, considering internal skills and external barriers.

Recent empirical studies have consistently validated the TPB framework across diverse cultural and institutional contexts. For example, Hueso et al. (2021) confirmed the mediating role of these dimensions between personal traits and entrepreneurial intentions among European students. Similarly, Murdiono et al. (2024**)** demonstrated that in Indonesia, entrepreneurial self-efficacy and perceived social support significantly bolster students' intentions to launch startups. Contrastingly, Naskar & Lindahl (2025) found cross-cultural variations in the relative importance of each TPB component, suggesting that cultural values modulate how attitudes, norms, and control perceptions impact entrepreneurial intention.

Complementing TPB, Shapero and Sokol's (1982) Entrepreneurial Event Model provides additional nuance by emphasizing the interplay of:

- Perceived desirability: The subjective attractiveness or appeal of entrepreneurship as a career option.
- Perceived feasibility: The assessment of available resources, skills, and environmental factors that facilitate venture creation.
- Propensity to act: The personal readiness or willingness to seize entrepreneurial opportunities when they arise.

This model highlights how social and cultural contexts — including family expectations, societal norms, and institutional frameworks — significantly influence entrepreneurial intentions. This is especially pertinent in Latin American societies characterized by strong familial ties and sometimes limited formal institutional support, as noted by Uctu & Al-Silefanee (2023)**.**

The combined use of these theoretical frameworks underpins the GUESSS survey, enabling a robust, multidimensional analysis of entrepreneurial intention and its drivers across universities worldwide.

2.2 Higher education as an entrepreneurship incubator

Universities have evolved beyond their traditional role of knowledge transmission, becoming pivotal ecosystems that cultivate entrepreneurial mindsets, skills, and behaviours. Higher education institutions are uniquely positioned to prepare students for the complexities and uncertainties of modern economies by fostering creativity, innovation, leadership, and resilience — all critical competencies for entrepreneurial success.

Entrepreneurship promotion within universities spans a spectrum of initiatives, including:

- Curricular offerings: Entrepreneurship courses and workshops focusing on business fundamentals, innovation, and venture management.

- Mentorship and coaching: Personalized guidance from experienced entrepreneurs and faculty to nurture ideas and entrepreneurial skills.
- Incubators and accelerators: Dedicated physical and virtual spaces that provide resources, networking opportunities, and access to funding.
- Coworking environments: Collaborative spaces that encourage knowledge exchange and entrepreneurial community building (Bakkar et al., 2021).

Educational research categorizes entrepreneurship education into three approaches:

- Theoretical approach: Focused on the transmission of business concepts, economic theories, and managerial techniques.
- Competency-based approach: Emphasizes the development of soft skills, attitudes, and behavioural competencies essential for entrepreneurship.
- Experiential approach: Prioritizes learning through direct engagement with real-world entrepreneurial projects, internships, and startup involvement (Jardim et al., 2021).

The experiential approach has garnered strong empirical support for its effectiveness in fostering entrepreneurial self-efficacy and actual venture creation (Laspita et al., 2024). By engaging students in practical activities, it bridges the gap between theory and practice and nurtures problem-solving and adaptability.

A notable study by Bodolica et al. (2024) involving Russian university students highlighted that while individual entrepreneurial orientation positively impacts startup activity scope, a supportive university environment significantly strengthens this effect. Intriguingly, formal entrepreneurship education alone did not yield significant results, suggesting the need for complementary ecosystem factors—such as networking opportunities and cultural support—to cultivate entrepreneurial engagement effectively.

Furthermore, research applying institutional theory by Lechuga Sancho et al. (2021) revealed that organizational climate and perceived legitimacy of entrepreneurial initiatives within universities enhance the impact of entrepreneurship education on new venture creation. This underscores the importance of fostering not only knowledge acquisition but also an environment that legitimizes and celebrates entrepreneurial efforts.

2.3 Individual and family factors in entrepreneurial intention

The construct of entrepreneurial self-efficacy—the belief in one's capability to successfully launch and manage a business—is one of the most consistent and powerful predictors of entrepreneurial intention (Maheshwari, 2021). High self-efficacy correlates with greater motivation, perseverance, and proactive behaviours necessary to overcome challenges in venture creation.

In addition to self-efficacy, personality traits and motivational factors contribute significantly to entrepreneurial propensity. For instance:

- Risk tolerance: Willingness to engage with uncertainty and potential failure.
- Need for achievement: Drive to accomplish challenging goals.
- Creativity: Ability to generate novel ideas and solutions.

Personality dimensions such as openness to experience**,** conscientiousness, and emotional stability have been linked to entrepreneurial success (Schlaegel et al., 2021). Moreover, soft skills including emotional intelligence and leadership capacity enhance interpersonal effectiveness and opportunity recognition.

Family background plays a crucial role, particularly in cultures where family structures are tightly knit. Entrepreneurial family members act as role models, transmit tacit knowledge, and provide access to social and financial capital, reducing the perceived risks of entrepreneurship (Kusumojanto et al., 2021). In Latin America, family influence is particularly

strong and can serve as a compensatory mechanism for institutional weaknesses (Vives, 2022).

The study by Gonzalez-Tamayo et al. (2024) applied the Unified Theory of Acceptance and Use of Technology (UTAUT) model to analyse entrepreneurial students' business outcomes across Europe and Latin America. They found that key factors—such as intention to succeed, social support, intrinsic motivation, and expected effort—significantly affect business performance. Importantly, gender and regional differences modulate these relationships, highlighting the need for inclusive and context-specific entrepreneurial policies.

2.4. University entrepreneurial ecosystems and contextual variables

The concept of entrepreneurial ecosystems in universities encompasses a network of tangible and intangible elements—resources, institutional actors, social norms, policies, and processes—that collectively support the generation and growth of new ventures. This includes:

- Training programs and entrepreneurship curricula.
- Physical infrastructures like incubators, innovation hubs, and coworking spaces.
- Access to finance, mentorship, and business networks.
- Linkages with external factors such as industry partners, government agencies, and investors (Valencia et al., 2022).

The quality and maturity of these ecosystems significantly impact students' entrepreneurial capabilities, motivation levels, and psychological well-being. A nurturing ecosystem fosters resilience, effective risk management, and a proactive attitude towards innovation (Laspita et al., 2024).

A comprehensive systematic review by Passavanti et al. (2023) synthesizing 288 studies underscored the rising prominence of student entrepreneurship globally. The authors advocate for holistic university policies that integrate gender-sensitive approaches, promote social entrepreneurship, and reinforce institutional mechanisms to maximize entrepreneurial outcomes. Cultivating an institutionalized entrepreneurial culture within universities is identified as a key determinant for achieving long-term and scalable impact.

2.5 Challenges and opportunities for university entrepreneurship in Paraguay

Youth entrepreneurship in Paraguay represents a vital engine for economic diversification, job creation, and social inclusion. Nevertheless, it faces multifaceted challenges including:

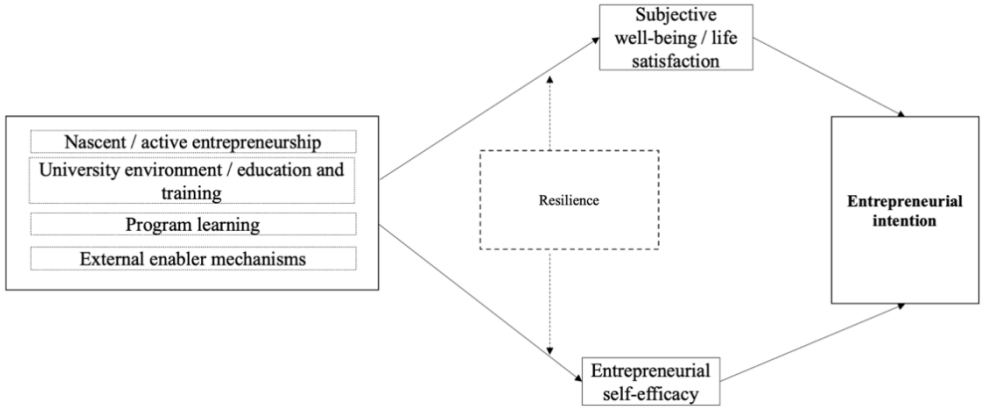
- High informality and limited access to formal financing channels.
- Insufficient support infrastructure for startups and early-stage ventures.
- Cultural barriers such as fear of failure, aversion to risk, and limited innovation tolerance (Salamzadeh & Dana, 2022; Dávalos, 2023).

While Paraguayan universities have begun integrating entrepreneurship into their academic offerings, significant gaps remain in bridging theoretical knowledge with practical experience. Moreover, coordination between universities, industry stakeholders, and government remains underdeveloped, weakening the potential impact of entrepreneurship programs.

The implementation of the GUESSS survey in Paraguay represents a pioneering effort to systematically map the entrepreneurial intentions and behaviours of university students, offering internationally comparable data. This will enable the identification of strengths, bottlenecks, and tailored policy recommendations to foster an enabling environment for

entrepreneurial growth, enhancing both competitiveness and social equity through inclusive entrepreneurship initiatives.

Figure 1 - *Theoretical Model of the Impact of the University Entrepreneurial Ecosystem on Entrepreneurial Intention*



Note*:* The model proposes that factors of the university ecosystem (active entrepreneurship, educational environment, program learning, and external enabling mechanisms) influence entrepreneurial intention through two psychological mediators: entrepreneurial self-efficacy and subjective well-being. Resilience plays a potential role as a moderator or indirect mediator. Solid arrows represent hypothesized direct relationships, while the dotted line indicates a non-central moderating or mediating relationship.

3. Methodology and Data Collection

3.1. Research design

This study employs a quantitative, descriptive, and correlational approach with a cross-sectional design. Its objective is to analyse factors influencing the entrepreneurial intention of university students in Paraguay, considering individual, familial, institutional, and experiential variables. The adapted and validated Latin American version of the GUESSS survey was used to systematically and reliably capture these dimensions.

3.2. Population and sample

A total of 2,020 valid responses were obtained from students at more than nine Paraguayan public and private universities. The sample is representative in terms of gender (58.28% female, 41.02% male), predominant age range (38.54% between 18 and 24 years), and educational level (81.24% undergraduate, 17.82% master's, 0.94% doctoral). The majority were from Administrative Sciences (45.02%), and 84.1% were Paraguayan nationals.

3.3. Instrument

The Spanish version of the GUESSS questionnaire, validated for Latin America, was employed. It includes items measuring:

- Entrepreneurial intention
- Entrepreneurial self-efficacy
- Subjective well-being
- Family background
- Institutional support
- Prior experience
- Sociodemographic variables

Construct reliability and validity were verified through confirmatory factor analysis, with most constructs exceeding recommended thresholds (factor loadings > 0.70, Cronbach's

alpha > 0.88, AVE > 0.66), except for the "Active Entrepreneurship" construct, which showed limited convergent validity (AVE = 0.355), suggesting the need for review and improvement in future studies.

3.4. Procedure

The survey was administered online via digital platforms provided by participating universities. Anonymity, data confidentiality, and informed consent were assured prior to participation.

3.5. Data Analysis

Descriptive statistics characterized the sample, and confirmatory factor analysis validated construct structure. Structural equation modeling (SEM) was conducted using Jamovi (SEMLj) and R (lavaan and semTools) to assess overall model fit and inter-variable relationships.

Goodness-of-fit indices confirmed model adequacy:

- $\chi^2/df = 3.12$ (acceptable range)
- RMSEA = 0.051 (< 0.06)
- CFI = 0.937 and TLI = 0.931 (> 0.90)
- SRMR = 0.049 (< 0.08)

Coefficient of determination (R^2) values showed the model explains 16.2% of variance in entrepreneurial intention, 43.1% in subjective well-being, and 59.9% in entrepreneurial self-efficacy, confirming the significant influence of exogenous factors on key personal resources affecting entrepreneurial intention.

3. Results

3.1. Measurement Model

All constructs showed adequate factor loadings (> 0.70), high internal reliability (Cronbach's alpha > 0.88), and convergent validity (AVE > 0.66), except for ActiveE.

Table 1 – *Reliability and Validity Analysis of Latent Constructs*

Construct	IC Beta (95%)	Alfa de Cronbach	CR (Omega)	AVE
ActiveE	0.571 - 0.614	0,518	0,521	0,355
University	0.803 - 0.896	0,908	0,909	0,714
External_E	0.862 - 0.922	0,962	0,963	0,811
Resilience	0.784 - 0.854	0,887	0,887	0,663
Political_A	0.673 - 0.805	0,849	0,85	0,587
Political_B	0.565 - 0.769	0,835	0,837	0,466
IntentionE	0.705 - 0.923	0,945	0,948	0,753
Subjective_WB	0.740 - 0.905	0,907	0,91	0,67
Entrepreneurial_SE	0.778 - 0.884	0,911	0,914	0,728

Note: IC Beta (95%)**:** 95% confidence intervals for standardized factor loadings obtained through confirmatory factor analysis (CFA). Cronbach's Alpha**:** Traditional indicator of internal consistency. CR (Omega): Composite reliability (also known as Omega), recommended due to its robustness compared to Alpha. AVE: Average Variance Extracted, used to assess convergent validity. Values ≥ 0.50 are considered acceptable (Fornell & Larcker, 1981).

All constructs meet the minimum requirements for reliability (α > 0.70 and CR > 0.70) and convergent validity (AVE > 0.50), except for the ActiveE construct, which requires review for future studies.

3.2. Model Fit

The set of fit indicators shows that the model has good overall fit properties, both in absolute and incremental terms (Hu & Bentler, 1999).

Table 2 - *Goodness-of-Fit Indices for the Measurement Model*

Indicator	Valor
Chi-cuadrado (χ^2)	2350
χ^2/gl	3,12
RMSEA	0,051
SRMR	0,049
CFI	0,937
TLI	0,931
GFI	0,963
AGFI	0,956

Note: χ^2 = Chi-square; df = degrees of freedom; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residual; CFI = Comparative Fit Index; TLI = Tucker–Lewis Index; GFI = Goodness-of-Fit Index; AGFI = Adjusted Goodness-of-Fit Index. Values indicate an acceptable model fit (e.g., RMSEA < 0.06, CFI and TLI > 0.90).

The values obtained confirm the acceptability of the model and enable interpretation of the structural model.

3.3. Coefficient of determination (R^2)

Before presenting the structural coefficients, the variance explained by the predictor variables in each of the model's dependent constructs was evaluated. The coefficient of determination (R^2) indicates the degree to which the independent variables explain the variance in the endogenous variables.

Table 3 - *Coefficient of Determination (R^2) for Endogenous Variables*

Variable	R^2
IntentionE	0.162
Subjective_WB	0.431
Entrepreneurial_SE	0.599

Note: R^2 indicates the proportion of variance explained by the predictors in the structural model for each endogenous variable. Higher values suggest stronger explanatory power.

16.2% of the variance in entrepreneurial intention (IntentionE), which is an acceptable level considering that it is a complex behavior influenced by multiple factors, is also estimated to account for 43.1% of the variance in subjective well-being (Subjective_WB), and 59.9% of the variance in entrepreneurial self-efficacy (Entrepreneurial_SE), demonstrating that this construct is highly determined by the exogenous variables in the model.

3.4. Structural model

Entrepreneurial intention is explained by 16.2% (R^2 = 0.162) by exogenous variables. The main effects were:

Table 4 - *Standardized Path Coefficients and Significance Levels in the Structural Model*

Relation	β estandarizado	p-valor
Subjective_WB → IntentionE	-0,08	0,053
Entrepreneurial_SE → IntentionE	0,437	< .001
ActiveE → Subjective_WB	0,017	0,692
University → Subjective_WB	0,108	0,035
External_E → Subjective_WB	0,16	0,002
Resilience → Subjective_WB	0,498	< .001

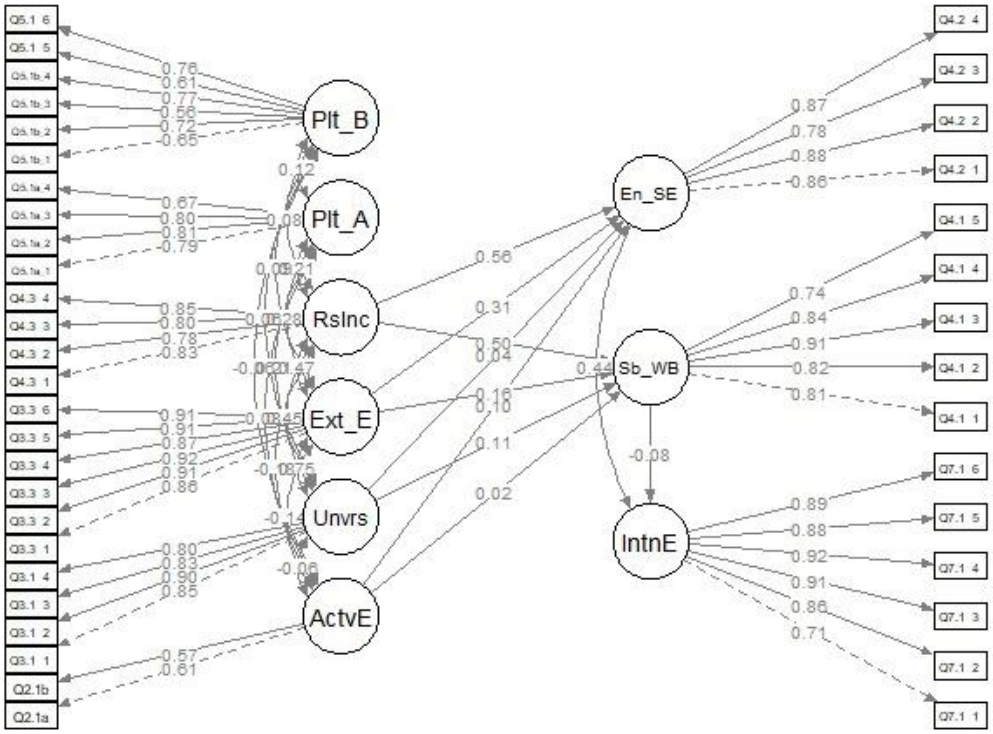
ActiveE → Entrepreneurial_SE	0,101	0,012
University → Entrepreneurial_SE	0,043	0,349
External_E → Entrepreneurial_SE	0,308	< .001
Resilience → Entrepreneurial_SE	0,563	< .001

Note: Standardized β coefficients represent the strength and direction of relationships between constructs. *p*-values indicate statistical significance ($p < .05$ is considered significant). Arrows (→) indicate directional influence from predictor to outcome variable.

The central role of entrepreneurial self-efficacy as a direct predictor of entrepreneurial intention is confirmed. Resilience and external learning are positioned as key drivers of personal resources (self-efficacy and well-being) and therefore as indirect determinants of entrepreneurial intention.

The validated model supports an integrative view of youth entrepreneurship, where institutional and personal factors interact in shaping entrepreneurial intention. Empirical evidence highlights the need to strengthen the development of entrepreneurial self-efficacy and well-being as mediators, suggesting lines of intervention that promote more stimulating university environments, contextualized learning programs, and the strengthening of socio-emotional competencies such as resilience.

Figure 2 - *Structural Equation Model (SEM) of Relationships Among Latent and Observed Variables*



Note: The diagram represents a Structural Equation Model (SEM) illustrating relationships between latent (ovals) and observed variables (rectangles). The standardized coefficients indicate the strength of these relationships, where values closer to 1 denote stronger associations. The directional arrows show predictive or causal links between variables.

4. Discussion

This study makes a significant contribution to understanding the university entrepreneurial ecosystem in Paraguay by addressing the complexity of entrepreneurial intention through a

structural model that integrates institutional, psychological, and contextual factors. The implementation of the GUESSS survey has enabled a rigorous diagnosis of the current state of entrepreneurship within the university system, providing a solid foundation for comparative analysis with other countries in the region and the international context.

The results clearly show that entrepreneurial self-efficacy is the strongest and most significant predictor of entrepreneurial intention, aligning with previous theories that emphasize the importance of individuals' belief in their own capabilities to face entrepreneurial challenges (Bandura, 1997; Chen, Greene & Crick, 1998). This finding underscores the need to design educational interventions that build students' confidence in their entrepreneurial skills, as this variable serves as a key mediator between ecosystem factors and entrepreneurial behaviour.

Additionally, resilience emerges as an essential psychological resource impacting both self-efficacy and subjective well-being, positioning itself as a critical indirect facilitator of entrepreneurial intention. This highlights the importance of fostering socio-emotional competencies within educational institutions so that future entrepreneurs can manage the uncertainty, adversity, and failures inherent to the entrepreneurial process. Furthermore, external learning and the university environment positively contribute to both subjective well-being and self-efficacy, confirming the dynamic interaction between internal and external factors within the entrepreneurial ecosystem.

However, the entrepreneurial activation construct (ActiveE) demonstrated insufficient reliability and convergent validity, limiting the interpretation of its role in the model and suggesting the need for methodological refinement in future studies. This may relate to contextual or cultural particularities in Paraguayan students' perceptions and experiences with entrepreneurship, which warrant further exploration.

Subjective well-being displayed a marginally significant negative relationship with entrepreneurial intention—an unexpected result that raises questions about the complexity of this variable in the local context. It is possible that in Paraguay, general measures of subjective well-being do not directly translate into higher entrepreneurial propensity, or that other mediating or moderating factors not included in the model influence this relationship. This opens avenues for future research to investigate how different dimensions of well-being or cultural factors affect entrepreneurial intention.

Overall, the model showed good fit according to statistical indices, and the variance explained in entrepreneurial intention (16.2%) is consistent with similar studies in the field, given that entrepreneurial intention is a multifaceted phenomenon influenced by numerous internal and external factors (Liñán & Chen, 2009). The higher explained variance for entrepreneurial self-efficacy (59.9%) and subjective well-being (43.1%) indicates that the model effectively captures the antecedents of these constructs, reinforcing the validity of the integrated approach.

Finally, the findings highlight the importance of implementing policies and programs aimed not only at improving technical knowledge and skills but also at strengthening psychological factors and designing stimulating university environments linked to the external entrepreneurial ecosystem. Such comprehensive strategies will help prepare entrepreneurs with greater personal and contextual readiness to face the challenges of entrepreneurship in Paraguay and the region.

5. Conclusions

The application of the GUESSS survey in the Paraguayan university context has allowed for the development and validation of an integrative model explaining entrepreneurial intention through the interaction of university ecosystem factors and personal psychological variables. This study provides a comprehensive, contextually adapted perspective with relevant practical and theoretical implications for fostering youth entrepreneurship in Paraguay.

- Entrepreneurial self-efficacy as a central predictor: Individuals' belief in their entrepreneurial capabilities is the primary direct determinant of entrepreneurial intention, confirming its crucial role as a focus for educational and public policy interventions.
- Resilience and external learning as indirect drivers: Resilience, along with contextualized external learning experiences, act as key facilitators of subjective well-being and entrepreneurial self-efficacy, demonstrating that developing psychological competencies and connections with the external ecosystem are essential to enhance entrepreneurial intention.
- Stimulating university environment: The university environment has a significant positive effect on subjective well-being, suggesting that improving institutional conditions and fostering entrepreneurship-friendly climates can indirectly support entrepreneurial intention.
- Need to refine the entrepreneurial activation construct: The low reliability and convergent validity of the ActiveE construct indicate the necessity to revise and improve its measurement for future research, considering cultural and contextual factors unique to Paraguay.
- Complexity of subjective well-being: The marginally negative relationship between subjective well-being and entrepreneurial intention underscores the importance of further investigating the dimensions and mechanisms of this variable within the local context, as well as possible cultural or social influences.
- Robust and valid model: The model fit indices and explained variance support the validity of the proposed structural model, positioning it as a valuable tool to diagnose the university entrepreneurial ecosystem in Paraguay and to enable international benchmarking.

This study lays the groundwork for implementing integrated strategies that combine the strengthening of technical, psychological, and social capacities among university students to promote a sustainable entrepreneurial ecosystem aligned with local needs and challenges. Moreover, it provides a methodological and empirical platform for future research aimed at monitoring and optimizing entrepreneurship policies and programs in Paraguay and the wider region.

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AUTHORS' CONTRIBUTIONS (CREDIT)

Conceptualization, JCA, VV, JJ; methodology, JCA, VV, JJ, GRC; software, VV, JJ; validation, KA, VV, JJ; formal analysis, VV, JJ, GRC; investigation, JCA, VV, JJ; resources, KA, VV, JJ; data curation, VV, JJ, GRC; writing—original draft, JCA, VV, JJ, GRC; writing—review and editing, JCA, VV, JJ; visualization, VV, JJ; supervision, JCA, VV, JJ; project administration, VV, JJ.

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The data that has been used is confidential.

ETHICS STATEMENT

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Ausencia estudiantil en clases virtuales universitarias: factores asociados en estudiantes de contextos vulnerables

Student absenteeism in university online classes: factors associated with students from vulnerable contexts

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Resumen

En la educación superior, las clases virtuales han abierto nuevas posibilidades de acceso y continuidad académica; sin embargo, han evidenciado desafíos que afectan la participación de muchos estudiantes. Comprender los motivos reportados de su ausencia en estos entornos resulta fundamental para identificar barreras, desigualdades y necesidades aún vigentes. Este estudio descriptivo, tuvo como objetivo distinguir los motivos personales y técnicos asociados con la ausencia de estudiantes del área de Informática en clases impartidas mediante modalidad virtual. La investigación se desarrolló con una muestra no probabilística de tipo intencional, integrada principalmente por estudiantes provenientes de comunidades rurales o localidades alejadas de la zona urbana. Los hallazgos muestran que la inasistencia estudiantil en entornos virtuales estuvo relacionada con factores personales, económicos, pedagógicos y tecnológicos. Entre ellos destacan la necesidad de trabajar, la sobrecarga de tareas, la falta de comprensión de los contenidos, el estrés derivado del tiempo prolongado frente a la computadora, la mala conexión a internet, la carencia de equipo de cómputo y el costo del uso de datos móviles. Los resultados permiten reconocer que la participación y permanencia en clases virtuales no dependen únicamente de la disposición del estudiante, sino también de condiciones estructurales asociadas con su trayectoria académica.

Palabras clave: Ausencia escolar, Educación virtual, Comunidad rural, Estudiante universitario, Contextos vulnerables

Abstract

In higher education, virtual classes have opened new possibilities for access and academic continuity; however, they have also revealed challenges that affect the participation of many students. Understanding the reported reasons for their absence in these environments is essential for identifying barriers, inequalities, and needs that remain relevant. This descriptive study aimed to distinguish the personal and technical reasons associated with the absence of students in the field of Computer Science from classes delivered in virtual mode. The research was conducted with a non-probabilistic intentional sample, composed mainly of students from rural communities or localities far from urban areas. The findings show that student nonattendance in virtual environments was related to personal, economic, pedagogical, and technological factors. Among these, the most notable were the need to work, task overload, lack of understanding of the course content, stress caused by prolonged time in front of the computer, poor internet connection, lack of computer equipment, and the cost of using mobile data. The results make it possible to recognize that participation and persistence in virtual classes do not depend solely on students' willingness, but also on structural conditions associated with their academic trajectory.

Keywords: School absenteeism, Virtual education, Rural community, University student, Vulnerable contexts

1. INTRODUCCIÓN

La incorporación de modalidades virtuales, hibridas y mediadas por tecnología en la educación superior ha ampliado las posibilidades de flexibilidad, acceso y continuidad académica; sin embargo, también ha puesto en evidencia desigualdades persistentes relacionadas con la conectividad, la disponibilidad de dispositivos, las competencias digitales, las condiciones socioeconómicas del alumnado y la forma en que se diseñan pedagógicamente las experiencias de aprendizaje.

Al respecto, Raes et al. (2020) señalan que el aula híbrida-virtual ofrece flexibilidad, debido a que permite elegir el lugar desde donde se asiste. Sin embargo, también advierten que esta modalidad puede resultar difícil de enseñar y de aprender para quienes participan a distancia; además, reporta menores niveles de relaciones con pares y motivación intrínseca.

En este contexto, la ausencia o desconexión del estudiante en clases virtuales constituye una problemática que afecta el seguimiento de los contenidos, la interacción con docentes y compañeros, así como el desempeño académico. Aunque los entornos virtuales ofrecen ventajas importantes para la distribución de materiales, la comunicación y la flexibilidad de acceso, su aprovechamiento no depende únicamente de la existencia de una plataforma digital, sino también de las condiciones reales en las que viven y estudian los jóvenes.

Las Tecnologías de la Información y de Comunicación (TIC) han impactado de manera significativa en los procesos educativos, favoreciendo nuevas formas de acceso al conocimiento, interacción y construcción del aprendizaje. En este sentido, Ali et al. (2023) afirman que el aprendizaje híbrido integra distintos modos de distribución del material, modelos de enseñanza y estilos de aprendizaje.

No obstante, la incorporación de las TIC en la enseñanza no garantiza por sí sola mejores resultados, ya que las instituciones educativas deben asumir el reto de integrar estas herramientas dentro de estrategias pedagógicas pertinentes, inclusivas y adaptadas a los diversos contextos del estudiantado. Al respecto Bawa y Bawa (2025) afirman que el acceso a la tecnología digital, por sí solo, no garantiza mejores resultados educativos; lo decisivo es cómo esa tecnología se integra en las prácticas de enseñanza.

En muchas instituciones de educación superior, particularmente en aquellas que atienden población proveniente de comunidades rurales o de sectores con limitaciones económicas, persisten barreras que dificultan el seguimiento regular de las actividades académicas virtuales. Entre ellas destacan la mala calidad del servicio de internet, la falta de equipo de cómputo, el uso limitado de teléfonos móviles como único recurso de acceso, la necesidad de trabajar para contribuir al gasto familiar y las dificultades para adaptarse a formas de enseñanza apoyadas en plataformas digitales.

Cedeño (2019) nos deja ver que con la aparición de las TIC han surgido nuevas formas de propiciar el proceso de enseñanza-aprendizaje, siendo una de ellas los entornos virtuales de aprendizaje, que tienen como propósito convertirse en un espacio que facilite la diversificación de las modalidades de enseñanza en los distintos niveles, contando con funcionalidades que permiten la comunicación fluida y activa entre los actores del proceso, promoviendo nuevos roles para el docente, que se convierte en un guía y moderador y para los estudiantes, con un papel más activo en la construcción de los conocimientos

Asimismo, el funcionamiento adecuado de un entorno virtual de aprendizaje exige algo más que infraestructura tecnológica. Es necesario contar con una organización pedagógica clara, materiales comprensibles, actividades pertinentes, acompañamiento docente y estrategias que mantengan la motivación del estudiante. Cuando estos elementos no se articulan adecuadamente, pueden presentarse desinterés, frustración, baja participación, ausencias frecuentes e incluso reprobación o abandono académico.

Después de la pandemia, muchas universidades públicas en México adoptaron el uso de clases virtuales para dar continuidad a sus cursos en sus diversos programas educativos, como los del área

de Informática; sin embargo, en el desarrollo de esta modalidad se observó que una parte importante de los estudiantes dejó de conectarse de manera constante a sus asignaturas. Esta situación generó preocupación en torno a las razones que explican dicha ausencia, especialmente considerando que una proporción significativa del alumnado proviene de comunidades alejadas de la zona urbana y de contextos con recursos limitados.

Por lo anterior surgió la necesidad de realizar esta investigación, cuyo objetivo fue identificar los motivos personales y técnicos asociados con la ausencia de los estudiantes del área de Informática, en asignaturas impartidas mediante modalidad virtual, así como describir la relación de dichas condiciones en su participación y desempeño académico.

Dado el carácter descriptivo del estudio, no se formularon hipótesis de investigación. En su lugar se establecieron las siguientes preguntas orientadoras para delimitar el análisis de los factores asociados con la ausencia estudiantil en clases virtuales:

1. ¿Cuáles son los motivos personales que los estudiantes del área de Informática, provenientes de contextos vulnerables, reportan como asociados con su ausencia en clases universitarias impartidas en modalidad virtual?
2. ¿Qué condiciones técnicas relacionadas con la conectividad, la disponibilidad de dispositivos y el uso de plataformas digitales se asocian con la ausencia de los estudiantes en sus clases virtuales?

Estas preguntas orientaron la organización del cuestionario, el análisis descriptivo de las respuestas y la interpretación de los hallazgos desde el marco de brecha digital multidimensional y la participación estudiantil.

2. REVISIÓN DE LA LITERATURA

La presente investigación se apoya en un marco teórico de brecha digital multidimensional y participación estudiantil en entornos virtuales. Desde la perspectiva de van Dijk (2020), la brecha digital no debe reducirse a la presencia o ausencia de internet, sino concebirse como una secuencia de desigualdades vinculadas con la motivación para usar la tecnología, el acceso material a dispositivos y conectividad, el desarrollo de habilidades digitales y el uso efectivo de los recursos digitales.

Esta perspectiva resulta pertinente para analizar el ausentismo en clases virtuales universitarias, debido a que permite distinguir si la ausencia se relaciona con barreras de acceso, limitaciones de manejo tecnológico, formas de uso académico de las plataformas o condiciones que reducen la motivación y participación del estudiante. Esta definición permite diferenciar el ausentismo como comportamiento observable de las causas asociadas, las cuales pueden ser personales, económicas, pedagógicas o técnicas (Gubbels et al., 2019).

La brecha digital se define como una forma de desigualdad social relacionada con las condiciones diferenciadas de acceso, apropiación y uso significativo de las tecnologías digitales. Para efectos de este trabajo, se asume como una brecha multidimensional integrada por tres dimensiones analíticas: a) brecha de acceso, referida a la disponibilidad de internet, conectividad estable, dispositivos adecuados y costo de conexión; b) brecha de habilidades y uso, vinculada con la capacidad para utilizar plataformas, organizar el aprendizaje en línea y aprovechar los recursos digitales con fines académicos; y c) brecha motivacional y de participación, relacionada con el interés, la confianza, la interacción, la presencia social y la disposición para mantenerse activo en el entorno virtual (van Dijk, 2020; Barragán Moreno & Guzmán Rincón, 2025).

La participación estudiantil se entiende como el grado de involucramiento conductual, cognitivo y emocional del estudiante en las actividades académicas. En clases virtuales, esta participación se manifiesta en la asistencia a sesiones sincrónicas, la interacción con los docentes y compañeros, la entrega de tareas, la atención sostenida, la autorregulación del aprendizaje y la percepción de pertenencia al grupo.

Desde esta perspectiva, la ausencia no solo representa una falta de conexión técnica, sino una reducción del compromiso académico y de las oportunidades de interacción necesarias para aprender (Fredricks et al., 2004; Miao & Ma, 2022).

Finalmente, la vulnerabilidad educativa se comprende como la condición en la que factores territoriales, económicos, tecnológicos, familiares o pedagógicos limitan las posibilidades reales de acceso, permanencia, participación y logro académico de los estudiantes.

En el contexto de esta investigación, la vulnerabilidad educativa se expresa principalmente en estudiantes provenientes de comunidades rurales o localidades alejadas de la zona urbana, con recursos económicos limitados, conectividad inestable, dependencia de datos móviles, falta de equipo de cómputo propio y necesidad de trabajar para apoyar a su familia. Esta definición permite vincular el concepto de contextos vulnerables con condiciones concretas de exclusión digital y desigualdad educativa.

Con base en este marco, los hallazgos del estudio se organizan en tres ejes interpretativos: primero, las brechas de acceso material y conectividad, que incluye la disponibilidad de internet, equipo de cómputo y costo de datos móviles; segundo, las brechas de habilidades y uso académico de la tecnología, que incluye la experiencia previa en cursos virtuales, el manejo de plataformas y la posibilidad de usar recursos digitales de manera suficiente; y tercero, las brechas de motivación, participación y permanencia, que comprende el aburrimiento, el estrés, la sensación de aislamiento, la sobrecarga de tareas y la baja interacción. Esta estructura analítica permite conectar los resultados con un modelo teórico específico y evitar que la ausencia estudiantil sea interpretada únicamente como una decisión individual.

La educación superior ha incorporado de manera creciente entornos virtuales, plataformas digitales y modelos de enseñanza mediados por tecnología como parte de sus prácticas regulares. Este proceso ha ampliado las posibilidades de acceso, flexibilidad y continuidad académica, pero también ha hecho visibles desigualdades persistentes que afectan la experiencia formativa del estudiantado.

En este sentido, la literatura reciente coincide en que la educación digital no depende únicamente de la disponibilidad de plataformas, sino de un entramado de condiciones tecnológicas, pedagógicas, económicas y personales que influyen en la participación real del alumno (Monazam Tabrizi et al., 2025; Michikyan et al., 2025).

Uno de los conceptos más relevantes para comprender esta problemática es la brecha digital, entendida no solo como la falta de acceso a internet o dispositivos, sino también como la desigualdad en la calidad de la conexión, el tipo de equipo disponible, las competencias digitales y las posibilidades reales de uso educativo de tecnología. Subramaniam et al. (2024) encontraron que la rápida expansión del aprendizaje en línea tiende a marginar con mayor fuerza a los estudiantes con menos recursos, ya que las limitaciones de conectividad y equipamiento reducen sus oportunidades de participar de forma efectiva en los cursos. En una línea similar, Barragán Moreno y Guzmán Rincón (2025) sostienen que la brecha digital es un fenómeno multidimensional que afecta el acceso, el aprendizaje y la retención en la educación superior, por lo que su atención requiere intervenciones institucionales y de política educativa más amplia.

La pertinencia de este marco se refuerza con evidencia regional sobre exclusión digital en América Latina y México. La Comisión Económica para América Latina y el Caribe (CEPAL, 2024) señala que la brecha digital al interior de los países puede analizarse por segmento socioeconómico y zona de residencia, y que la diferencia de acceso a internet entre hogares urbanos y rurales puede llegar a casi 50 puntos porcentuales en algunos países. Esta evidencia resulta relevante para estudios situados en poblaciones rurales, donde la virtualidad educativa depende de condiciones de conectividad que no se distribuyen de manera homogénea.

Asimismo, Herrera, Huepe y Trucco (2025), en un documento de la CEPAL, sostienen que la brecha digital forma parte de las brechas estructurales de América Latina y el Caribe, debido a que persisten desigualdades de acceso, uso de herramientas digitales y desarrollo de competencias.

Esta perspectiva permite comprender que la exclusión digital educativa no se limita a la conexión de internet, sino que también involucra la capacidad de los estudiantes para usar las tecnologías con fines de aprendizaje, comunicarse académicamente y sostener su trayectoria formativa en entornos mediados por plataformas digitales.

En México, la Encuesta Nacional sobre Disponibilidad y Uso de Tecnologías de la Información en los Hogares (ENDUTIH) 2024, del Instituto Nacional de Estadística y Geografía (INEGI) reportó que 73.6% de los hogares tenía acceso a internet, mientras que solo 43.9% disponía de computadora, laptop o tableta; además, los porcentajes más bajos de hogares con internet se ubicaron en entidades del sur del país, como Guerrero, Oaxaca y Chiapas (INEGI, 2025).

Estos datos contextualizan la problemática analizada en este estudio, ya que la dependencia del teléfono celular, el gasto en datos móviles y la falta de equipos propios observados en los participantes corresponden con desigualdades tecnológicas presentes en regiones con menor disponibilidad de infraestructura digital.

Además del acceso material, diversos estudios señalan que la participación estudiantil en entornos virtuales está estrechamente relacionada con variables como la autorregulación, la interacción académica y la sensación de presencia social. Miao y Ma (2022) reportaron que la autorregulación y la presencia social se asocian positivamente con el compromiso del estudiante en línea, lo que sugiere que la permanencia y el involucramiento en cursos virtuales no dependen solamente de conectarse a una clase, sino también de la capacidad del estudiante para organizar su aprendizaje y sentirse integrado dentro del entorno educativo.

De manera complementaria, Xavier y Meneses (2022) identificaron que los retos de tiempo, las cargas externas y los conflictos entre estudio, trabajo y vida personal representan barreras significativas para la persistencia en modalidades en línea, específicamente en estudiantes que cursan sus primeros periodos académicos. La literatura también destaca que el diseño pedagógico del curso virtual constituye un factor central para explicar la participación y la continuidad del alumnado.

Monazam Tabrizi et al. (2025) encontraron que la motivación, la retroalimentación y el apoyo emocional se relacionan de manera importante con la efectividad del aprendizaje digital, y subrayan que las plataformas funcionan mejor cuando sus recursos tecnológicos se articulan con una organización pedagógica coherente, interacción significativa y acompañamiento docente. En una línea semejante, Al Issa et al. (2024) muestran que el valor percibido de la experiencia educativa influye en el compromiso de los estudiantes en el aprendizaje en línea, lo que indica que la participación también depende de que el educando encuentre sentido, utilidad y pertinencia en las actividades académicas propuestas.

Por otro lado, las investigaciones recientes advierten que los problemas de infraestructura, la mala conectividad, las distracciones y ciertas deficiencias en la gestión docente pueden traducirse en menor involucramiento y bajo desempeño académico. Rabby et al. (2025), en su estudio sobre aulas virtuales universitarias, identificaron que los obstáculos de infraestructura, la incompetencia instructiva percibida y las distracciones reducen el compromiso del estudiante y terminan afectando negativamente su rendimiento académico.

Asimismo, Enciso-Huamani et al. (2025) encontraron que la ubicación geográfica, la calidad del acceso a internet y el tipo de dispositivos influyen en la percepción que tienen los estudiantes sobre los servicios académicos, siendo específicamente desfavorable la experiencia de quienes viven en zonas rurales, carecen de conexión estable y dependen principalmente del teléfono móvil para seguir sus estudios.

En conjunto estos antecedentes permiten afirmar que la ausencia o desconexión estudiantil en clases virtuales universitarias constituyen un fenómeno multicausal, en el que convergen desigualdades tecnológicas, condiciones socioeconómicas, exigencias personales y elementos pedagógicos del proceso de enseñanza.

Desde esta perspectiva, comprender por qué los estudiantes dejan de asistir, participan poco o se desvinculan de sus asignaturas virtuales resulta fundamental para diseñar estrategias institucionales más inclusivas y sensibles a los contextos reales del alumnado.

Desde este marco teórico, el ausentismo en clases virtuales se interpreta como un fenómeno asociado con desigualdades acumuladas. Las brechas de acceso explican las dificultades para ingresar y permanecer conectado; las brechas de habilidades y uso ayudan a comprender los problemas para manejar plataformas, comprender materiales y organizar el aprendizaje; las brechas motivacionales y de participación permiten analizar el aburrimiento, el estrés, la baja interacción y la pérdida de sentido académico.

Por ello, la ausencia estudiantil en modalidad virtual debe ser examinada como resultado de la relación entre condiciones tecnológicas, económicas, pedagógicas y personales, especialmente cuando se estudia a jóvenes de contextos rurales o con recursos limitados.

3. MATERIALES Y MÉTODO

La presente investigación es de tipo descriptivo, ya que busca identificar y mostrar los factores personales y técnicos asociados a la ausencia de estudiantes del área de Informática que cursaban asignaturas impartidas mediante modalidad virtual. El estudio se realizó con estudiantes del área de Informática de una universidad pública en el sureste de la República mexicana, la cual cuenta con programas de calidad que han sido reconocidos por organismos nacionales, utilizando una muestra no probabilística de tipo intencional.

3.1 PARTICIPANTES

La población utilizada en este trabajo de investigación está conformada por 82 estudiantes que cursaban alguna asignatura del área de Informática como Algoritmos, Programación 1, Programación 2, Fábrica de software, Ensamblador o Compiladores, cuya selección se justificó por la pertinencia de estos cursos para observar el fenómeno del ausentismo en clases virtuales, ya que demandan seguimiento continuo, práctica constante, resolución de ejercicios y uso frecuente de recursos tecnológicos.

Además, representan distintos momentos de la trayectoria curricular: cursos iniciales de formación lógica y programación, asignaturas intermedias de desarrollo de software y materias especializadas de mayor complejidad técnica. Esta diversidad permitió recuperar información de estudiantes con diferentes niveles de avance académico, pero expuestos a condiciones institucionales semejantes durante la modalidad virtual.

La muestra fue intencional porque se buscó incluir a estudiantes que estuvieran directamente vinculados con el problema de investigación: haber cursado asignaturas del área de Informática en modalidad virtual y enfrentar condiciones personales, económicas, pedagógicas o técnicas que podían influir en su ausencia. La selección respondió, por tanto, a criterios de pertenencia y accesibilidad, ya que se trabajó con grupos donde se había observado ausencia recurrente durante las clases virtuales y donde el uso de internet, plataformas digitales y dispositivos tecnológicos eran indispensables para participar en las actividades académicas.

En este sentido, la muestra no tuvo como finalidad representar estadísticamente a toda la población universitaria, a otros programas educativos o a instituciones con condiciones diferentes, sino documentar de manera contextual los factores asociados al ausentismo en un grupo de estudiantes cuyas características eran relevantes para el objetivo del estudio.

Los hallazgos deben interpretarse como evidencia contextual de un grupo específico de estudiantes del área de Informática de una universidad pública del sureste de México. Por ello su valor principal radica en identificar patrones, condiciones y problemáticas que pueden ser comparables con poblaciones estudiantiles de características similares, pero no extrapolables en términos estadísticos a otros contextos.

Del total de estos participantes de las materias antes mencionadas, se les aplicó un cuestionario, donde se obtuvo que 21 (26%) cursaban Algoritmos, 19 (23%) eran de Programación 1, 15 (19%) de

Programación 2, 10 (12%) de Fábrica de software, 9 (11%) cursaban Compiladores y solo 7 (9%) de ellos tomaban clase de lenguaje Ensamblador; también se pudo obtener que del total de esta población 22% (18 estudiantes) eran mujeres y que 78% (64 estudiantes) eran hombres.

Cabe hacer mención que la Universidad Pública donde se llevó a cabo el estudio, se ubica en un municipio distante de la capital del estado de Tabasco, México. Esta condición territorial resulta relevante, debido a que una parte de la población estudiantil proviene de comunidades rurales, rancherías o poblados, alejados de la zona urbana, lo cual puede asociarse con limitaciones en el acceso a servicios de conectividad, dispositivos tecnológicos y espacios adecuados para el seguimiento regular de clases virtuales.

Asimismo, a partir de la información contextual de la institución y de las respuestas proporcionadas por los estudiantes en el cuestionario, se identificaron condiciones económicas y tecnológicas que podrían dificultar su participación continua en las actividades académicas mediadas por tecnología.

Entre estas condiciones se encontraron la dependencia de datos móviles, la conexión intermitente a internet, el uso de teléfonos celulares como principal dispositivo de estudio, la necesidad de trabajar o apoyar económicamente al hogar, así como las dificultades para sostener los gastos relacionados con la conectividad.

Con el propósito de precisar la categoría analítica de "contextos vulnerables", en este estudio dicho término se entendió como el conjunto de condiciones territoriales, económicas y tecnológicas que pueden limitar la participación regular del estudiante en clases universitarias impartidas en modalidad virtual.

Para efecto de esta investigación, se consideró que un estudiante pertenecía a un contexto vulnerable cuando, a partir de la información contextual de la institución y de las respuestas autoinformadas en el cuestionario, presentaba al menos dos de los siguientes criterios: (a) residir en comunidades rurales, rancherías o poblados alejados de la zona urbana donde se ubica la universidad; (b) no contar con servicio de internet en el hogar, disponer de una conexión intermitente o depender principalmente de datos móviles para conectarse a clases; (c) utilizar como dispositivo principal de estudio un teléfono celular, un equipo compartido, prestado o no disponer de equipo de cómputo propio; (d) manifestar limitaciones económicas asociadas con la necesidad de trabajar o contribuir al gasto familiar; y (e) presentar dificultades materiales para sostener la asistencia continua, como el gasto recurrente en recargas de datos móviles, la mala calidad de la señal en su localidad o tener la necesidad de recurrir a espacios externos para conectarse.

Es importante señalar que no se empleó un índice compuesto ni una clasificación institucional preexistente de vulnerabilidad. La identificación de los participantes como estudiantes de contextos vulnerables se realizó de manera operativa con base en tres fuentes de información: la caracterización territorial de la población estudiantil atendida por la universidad, las respuestas cerradas del cuestionario relacionadas con conectividad, dispositivos y motivos personales de ausencia, así como las respuestas abiertas en las que los propios estudiantes describieron limitaciones económicas, trabajo familiar, falta de internet, uso de celular y dificultades para sostener su participación en las clases virtuales.

Asimismo, no se utilizaron como criterios directos el ingreso mensual familiar exacto, el nivel educativo de los padres, la distancia medida en kilómetros al centro urbano más cercano ni las condiciones específicas de vivienda, debo a que estas variables no fueron recabadas formalmente en el instrumento aplicado.

Por ello, la noción de contexto vulnerable no debe interpretarse como una categoría socioeconómica universal ni plenamente generalizable, sino como una delimitación operativa construida a partir de las condiciones rurales, económicas y tecnológicas observadas en la muestra analizada.

3.2 Instrumento

En esta investigación se utilizó como herramienta de recolección de datos un cuestionario, conformado por 13 preguntas cerradas de opción múltiple, con preguntas orientadas a identificar antecedentes de

participación en cursos virtuales, frecuencia de inasistencia, motivos personales de ausencia, motivos técnicos relacionados con el uso de la tecnología, nivel de participación en clase y resultados académicos reportados en relación con dicha ausencia.

El cuestionario está estructurado en tres bloques, el Bloque A: Datos generales, el Bloque B: Ausencia por motivos personales y Bloque C: Ausencia por motivos técnicos. En el primer bloque se recabaron los datos generales de los estudiantes, en el segundo bloque se indagaron los aspectos personales asociados con sus ausencias en su proceso de aprendizaje y en el tercer bloque se indagaron los aspectos técnicos relacionados con el uso de la tecnología, reportados por los estudiantes como motivos de ausencia en sus actividades académicas (ver Tabla 1) y que se vincularon con la decisión de ausentarse o abandonar las actividades académicas de las materias que cursaban.

Tabla 1 - *Aspectos personales y técnicos considerados en el cuestionario*

Bloque B: Ausencia por motivos personales	
Propósito: ***Conocer los motivos personales que condujeron al estudiante a ausentarse de sus clases virtuales.***	
Pregunta	**Respuestas**
¿Qué propició que abandonarás tus clases virtuales?	Me aburría como daba clase el profesor Porque me conectaba y el maestro no daba clase Estuve enfermo con COVID Me tuve que poner a trabajar en el campo Me distraía de la clase por usar las redes sociales No entendía lo que se explicaba Era mucha la información que se exponía Porque el maestro daba la clase muy rápido Eran muchas las tareas que dejaban Me sentía solo al no ver mis compañeros Me aburría estar viendo y escuchando la clase virtual Me provocaba estrés estar frente a la computadora Otras
Bloque C: Ausencia por motivos técnicos	
Propósito: ***Conocer los motivos técnicos que, por el uso de la tecnología, fueron reportados como asociados con la ausencia de los estudiantes en sus clases virtuales.***	
Pregunta	**Respuesta**
¿Qué problemas técnicos tuviste que provocaron que abandonaras tus clases?	No tengo internet en casa Mala conexión de internet No tenía equipo de cómputo Si usaba mi celular me gastaba mis datos En mi localidad no hay señal de internet Mi computadora es muy lenta La plataforma no reconocía mi usuario La plataforma me sacaba de la sesión de clase La plataforma era complicada de entender Otras

Fuente: Elaboración propia

La elaboración de esta herramienta de recolección de datos se hizo mediante la aplicación de administración de encuestas de Google Forms y para la distribución del vínculo para acceder al cuestionario, se recurrió a usar la red social de Facebook, enviando este enlace a los estudiantes agregados al perfil académico con el que se trabaja en las diversas asignaturas.

3.3 Validación del cuestionario y fiabilidad

Para fortalecer la validez del contenido del instrumento, el cuestionario fue sometido a una revisión de pertinencia y claridad, considerando la correspondencia entre los ítems y las dimensiones definidas

para el estudio, la cual permitió verificar que las preguntas fueran comprensibles para los estudiantes, que las opciones de respuesta estuvieran relacionadas con el objetivo de la investigación y que no existieran formulaciones ambiguas o repetitivas.

Dado que el instrumento estuvo integrado principalmente por preguntas cerradas de opción múltiple orientadas a describir frecuencias y porcentajes, y no por una escala de Likert destinada a medir un constructo latente único, no se estimó el coeficiente alfa de Cronbach. La fiabilidad operativa se atendió mediante la revisión de consistencia lógica del cuestionario, la depuración de opciones de respuesta y la verificación de que los registros recuperados fueran completos y coherentes con los criterios de análisis establecidos.

3.4 Consideraciones éticas

La participación de los estudiantes fue voluntaria y se realizó previo consentimiento informado, explicando el propósito académico de la investigación, el uso confidencial de la información y la posibilidad de no responder el cuestionario sin ninguna consecuencia académica. No se recabaron nombres ni datos personales que permitieran identificar directamente a los participantes; por ello, los resultados se presentan de manera agregada y anónima. La aplicación del instrumento se efectuó con fines estrictamente académicos, respetando los principios de confidencialidad, anonimato y protección de la información proporcionada por los estudiantes.

3.5 Procedimiento de análisis de datos

Las respuestas obtenidas mediante Google Forms fueron exportadas a una hoja de cálculo para su organización, codificación y revisión. El análisis estadístico fue de tipo descriptivo; se calcularon frecuencias absolutas y porcentajes para cada pregunta del cuestionario, con el propósito de identificar la distribución de las respuestas relacionadas con la ausencia, los motivos personales de ausencia, los motivos técnicos y los resultados académicos reportados por los estudiantes en relación con su ausencia.

En las preguntas de respuesta múltiple, los porcentajes se calcularon tomando como referencia el número de estudiantes que reportaron haberse ausentado de sus clases virtuales, por lo que una misma persona podía seleccionar más de una causa. Las respuestas abiertas fueron revisadas mediante una categorización temática simple, agrupando expresiones recurrentes sobre trabajo, falta de recursos económicos, problemas de conectividad, carencia de equipo de cómputo y gasto en datos móviles; estas respuestas se utilizaron para complementar e interpretar los resultados cuantitativos.

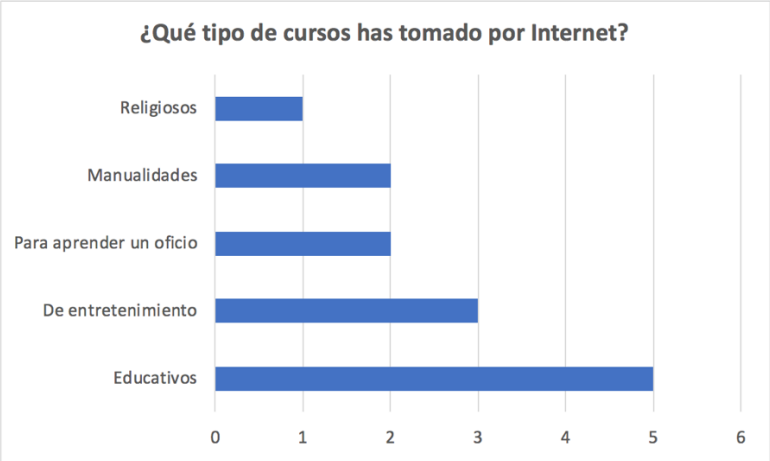
4. Resultados y discusión

4.1 Presentación de resultados

Como bien se mencionó en párrafos anteriores, en este trabajo la muestra estuvo conformada por un total de 82 estudiantes del área de Informática. De estos jóvenes que participaron en el estudio, 22% (F=18 estudiantes) fueron mujeres, siendo la población de varones la que predominó con un 78% (F=64 estudiantes), con un rango de edades entre los 18 a 24 años.

Al indagar sobre experiencias previas en cursos virtuales, un 85% (F=70 estudiantes) dijeron que “No”, mientras que 15% (F=12 estudiantes) respondieron que “Sí”. A los 12 estudiantes (15%) que respondieron afirmativamente que sí habían participado en alguna clase virtual, se les preguntó sobre el tipo de curso que habían tomado por internet (ver Figura 1), donde 5 de ellos (42%) mencionaron que de tipo “Educativos”, 3 (25%) “De entretenimiento”, 2 (17%) tomaron cursos “Para aprender un oficio” y “manualidades”, mientras que de tipo “Religioso” solo 1 (8%) habían tomado.

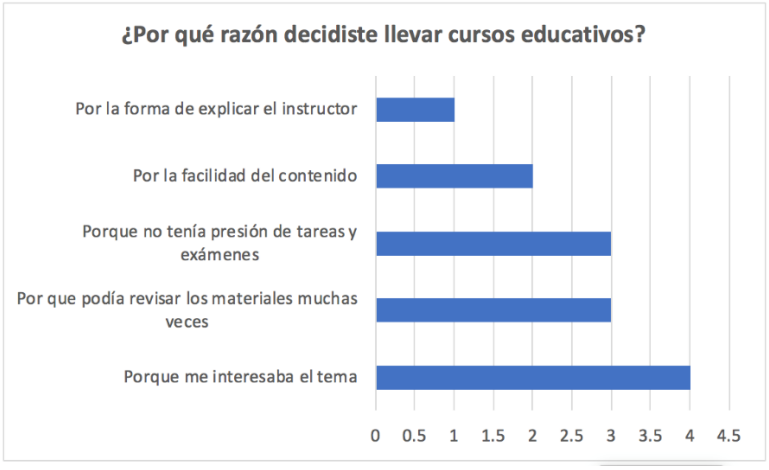
Figura 1- *Tipo de curso que el estudiante había cursado por internet*



Fuente: Elaboración propia

A los 5 estudiantes que en la pregunta anterior respondieron que habían llevado cursos de tipo educativo, se les preguntó la razón por la cual los habían cursado (ver Figura 2), respondiendo 80% (F=4 estudiantes) que "Porque me interesaba el tema", dos respuestas obtuvieron un 60% (F=3 estudiantes) que son "Porque podía revisar los materiales muchas veces" y "Porque no tenía presión de tareas y exámenes", un 40% (F=2 estudiantes) eligieron "Por la facilidad del contenido" y solo 20% (F=1 estudiante) "Por la forma de explicar el instructor".

Figura 2- *Razón por la que el estudiante decidió llevar un curso en línea*



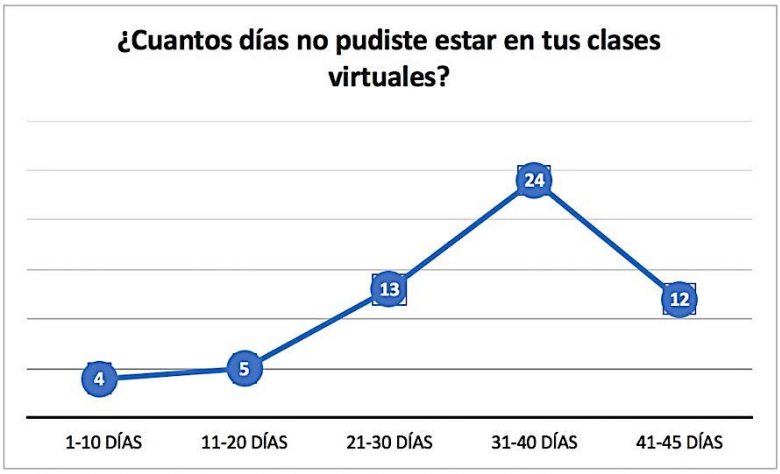
Fuente: Elaboración propia

Hasta este momento podemos notar que 85% de los estudiantes que forman parte de este estudio, no habían incursionado en cursos virtuales y que solo 5 estudiantes de toda la muestra habían tomado clases por internet de tipo educativo.

En relación con la asistencia, 58 estudiantes (71%) indicaron haber dejado de asistir a alguna de sus materias impartidas en modalidad virtual, mientras que 24 estudiantes (29%) señalaron no haber incurrido en esa situación. Esta proporción muestra que la ausencia estudiantil fue un fenómeno significativo dentro del grupo analizado.

Respecto al tiempo de inasistencia se les preguntó ¿Cuántos días no pudiste estar en tus clases virtuales?, obteniéndose que una parte importante de los estudiantes reportó haber estado ausente durante periodos prolongados, lo cual sugiere que no se trató únicamente de faltas periódicas, sino de desconexiones frecuentes o sostenidas a lo largo del curso (ver Figura 3).

Figura 3 - *Días que el estudiante no asistió a clases*



Fuente: Elaboración propia

Entre los motivos personales reportados con mayor frecuencia por los estudiantes que se ausentaron de sus clases, destacaron la necesidad de trabajar en el campo y la sobrecarga de tareas, ambos motivos con 22 estudiantes (38%); 20 estudiantes (34%) mencionaron que "No entendía lo que se explicaba", 18 estudiantes (31%) seleccionaron "Me provocaba estrés estar frente a la computadora" y para la respuesta "Era mucha la información que se exponía", 16 estudiantes (28%) la seleccionaron. Estos resultados sugieren que la ausencia estuvo asociada con una combinación de exigencias económicas, académicas y emocionales (ver Tabla 2).

Tabla 2 - *Motivos personales asociados con la ausencia del estudiante en sus clases virtuales*

Ítem	***f***	**%**
Me tuve que poner a trabajar en el campo	22	38%
Eran muchas las tareas que dejaban	22	38%
No entendía lo que se explicaba	20	34%
Me provocaba estrés estar frente a la computadora	18	31%
Era mucha la información que se exponía	16	28%
Porque me conectaba y el maestro no daba clase	10	17%
Me aburría estar viendo y escuchando la clase virtual	10	17%
Me aburría como daba clase el profesor	6	10%
Estuve enfermo de COVID	6	10%
Porque el maestro daba la clase muy rápido	4	7%
Me sentía solo al no ver mis compañeros	4	7%
Me distraía de la clase por usar las redes sociales	2	3%

Fuente: Elaboración propia

Cabe hacer mención que en la pregunta anterior se dejó una opción para una respuesta abierta, para que pudieran escribir la causa de la ausencia en sus clases virtuales, por si no la encontraban dentro de la lista proporcionada, teniendo respuestas como: haber padecido alguna enfermedad, falta de recursos económicos, tener que recurrir a trabajar para ayudar a su familia o gastar demasiado en las recargas para sus teléfonos móviles.

Algunas respuestas expresadas por los estudiantes son las siguientes:

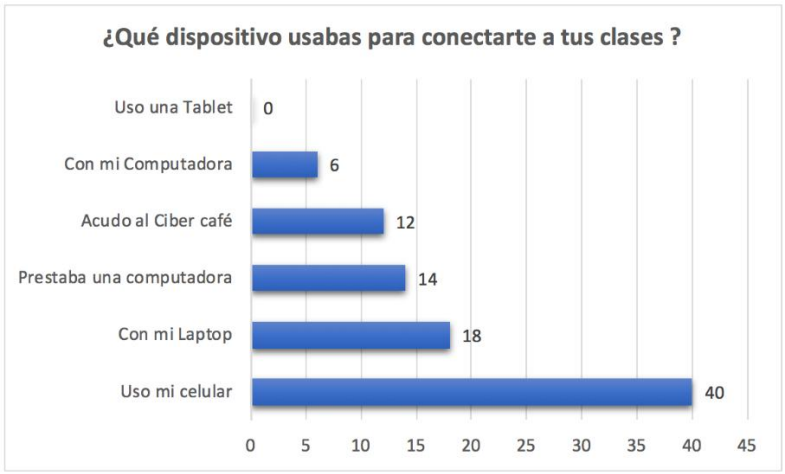
"En mi caso vivo en un poblado y no cuento con alguna beca… para sobrevivir con mi familia me vi en la necesidad de trabajar en el campo, así que con todo eso me vi obligado a tener que abandonar mis estudios"

"Me despidieron del trabajo, yo pago mis estudios y al no tener solvencia económica no pude conectarme a mis clases"

"Tuve que trabajar para ayudar con los gastos de mi familia"

Para estas clases virtuales, los estudiantes requerían utilizar algún dispositivo tecnológico para hacerlo (ver Figura 4), 69% de los estudiantes manifestaron utilizar principalmente el teléfono celular, mientras que una parte menor (10% de los estudiantes) contaba con laptop o computadoras propias. También hubo quienes dependían de equipos prestados o del acceso a cibercafés, lo cual evidencia limitaciones materiales para sostener una participación constante en las actividades académicas.

Figura 4 - *Dispositivos tecnológicos usados por los estudiantes*



Fuente: Elaboración propia

También se les preguntó a los estudiantes sobre los motivos técnicos asociados con la ausencia (ver Tabla 3), señalando principalmente la mala conexión a internet (62%), la falta de servicios de internet en casa (38%), el gasto excesivo de datos móviles al usar el celular (31%), la carencia de equipo de cómputo (24%) y la lentitud de la computadora disponible (24%). Tales hallazgos sugieren que la conectividad y la disponibilidad de dispositivos se relacionan con barreras relevantes para el acceso equitativo a la educación virtual.

Tabla 3 - *Motivos técnicos asociados con la ausencia del estudiante en sus clases virtuales*

Ítem	***f***	**%**
Mala conexión de internet	36	62%
No tengo internet en casa	22	38%
Si usaba mi celular me gastaba mis datos	18	31%
No tenía equipo de cómputo	14	24%
Mi computadora es muy lenta	14	24%
La plataforma me sacaba de la sesión de clase	12	21%
En mi localidad no hay señal de internet	8	14%
La plataforma era complicada de entender	8	14%
La plataforma no reconocía mi usuario	2	3%

Fuente: Elaboración propia

Para esta pregunta, también se dejó una opción para una respuesta abierta, para que pudieran escribir la causa de la ausencia en sus clases virtuales, por todos los problemas técnicos que padecieron por el uso de la tecnología. Algunas respuestas expresadas por los estudiantes son las siguientes:

"En mi comunidad no hay servicio de internet, para conectarme a mis clases"

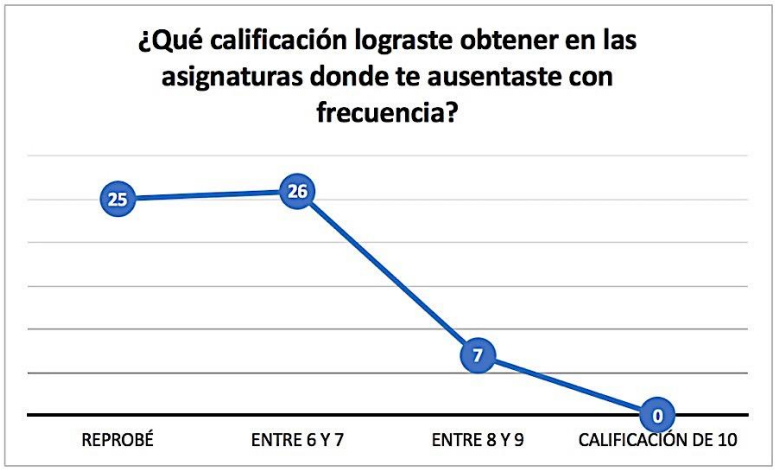
"Tengo computadora, pero el servicio de internet es muy malo…normalmente usaba mi equipo cuando estaba en la escuela"

"No tengo computadora y uso mi celular para conectarme, pero me consume muchos datos… solo entraba entre ratos a mis clases"

Asimismo, indagamos si el estudiante había participado durante sus clases en línea, a lo que un 62% (F=36 estudiantes) respondió que "Casi nunca", un 17% (F=10 estudiantes) eligió que "Nunca", un 14% (F=8 estudiantes) optó por "Algunas veces" y solo un 7% (F=4 estudiantes) dijo "Siempre".

Para explorar la relación entre los motivos de ausencia y las calificaciones reportadas, se preguntó ¿Qué calificación lograste obtener en las asignaturas donde te ausentaste con frecuencia?, encontrándose que un 45% (26 estudiantes) obtuvieron una calificación entre 6 y 7, un 12% (7 estudiantes) entre 8 y 9, ningún estudiante logró alcanzar una calificación de 10, también se observó que 43% (25 estudiantes) no lograron aprobar sus asignaturas (ver Figura 5). Este resultado sugiere una relación entre la inasistencia sostenida y los resultados académicos obtenidos, sin asumir una relación causal.

Figura 5 - *Calificaciones obtenidas por los estudiantes*



Fuente: Elaboración propia

4.2 Discusión de resultados

Los hallazgos de esta investigación permiten plantear que la ausencia estudiantil en clases virtuales universitarias no puede interpretarse únicamente como un problema de disposición personal, sino como un fenómeno asociado con múltiples condiciones estructurales relacionadas con la permanencia y participación académica de los estudiantes.

En primer lugar, los resultados muestran que una parte importante de los estudiantes carecía de experiencia previa en cursos virtuales, lo cual sugiere que la adaptación a esta modalidad implicó retos significativos no solo en términos tecnológicos, sino también en comprensión de nuevas dinámicas de estudio, interacción y seguimiento de contenidos.

En segundo lugar, los motivos personales reportados sugieren que las responsabilidades económicas y familiares se relacionan estrechamente con la continuidad académica. El hecho de que varios estudiantes señalaran haberse incorporado al trabajo, particularmente en actividades del campo, revela que el estudio compite con otras necesidades básicas de subsistencia, sobre todo en contextos rurales o de bajos recursos.

A ello se suman factores pedagógicos que también estuvieron relacionados con la ausencia, como exceso de tareas, dificultad para comprender las explicaciones, saturación de información y estrés asociado al tiempo prolongado frente a la computadora. Estos elementos sugieren que la organización didáctica de las asignaturas en entornos virtuales requiere considerar ritmos de aprendizaje, claridad expositiva, dosificación de actividades y estrategias que favorezcan una participación más activa y significativa.

Desde el punto de vista técnico, los datos muestran una persistente brecha digital. La mala conexión a internet, la falta de servicio en casa, la dependencia del teléfono celular, el gasto en datos móviles y la ausencia de equipo de cómputo constituyen obstáculos reales que limitan el acceso regular a las clases. En este sentido, la virtualidad no puede asumirse como una modalidad homogénea ni

equitativa para todos los estudiantes, especialmente cuando las condiciones materiales son tan desiguales.

Al organizar estos hallazgos mediante el marco de brecha digital multidimensional, se observa que los problemas de mala conexión, falta de internet en casa, carencia de equipo de cómputo y gastos en datos móviles corresponden principalmente a la brecha de acceso. La dependencia del teléfono celular, la lentitud de los equipos, la escasa experiencia previa en cursos virtuales y las dificultades para comprender o usar las plataformas se vinculan con brechas de habilidades y uso académico de la tecnología. En definitiva, el aburrimiento, el estrés, la sensación de aislamiento, la sobrecarga de tareas y la baja participación se relacionan con la dimensión motivacional y de involucramiento estudiantil.

Esta lectura permite sostener que el ausentismo observado no es un fenómeno aislado, sino una expresión de desigualdades digitales y educativas que se acumulan en estudiantes procedentes de contextos rurales o con recursos limitados. Esta interpretación también permite conectar los resultados con la literatura sobre exclusión digital.

Las condiciones reportadas por los estudiantes coinciden con los señalamientos de la CEPAL sobre la persistencia de brechas territoriales, socioeconómicas y de competencias digitales en América Latina, así como con los datos de la ENDUTIH sobre disponibilidad desigual de internet y computadora en los hogares mexicanos.

Por ello, el contexto rural y la precariedad tecnológica no deben entenderse únicamente como antecedentes descriptivos de la muestra, sino como componentes centrales para explicar la forma en que se configura la participación estudiantil en las clases virtuales.

La baja participación en las sesiones y las calificaciones obtenidas sugieren una relación desfavorable entre la ausencia estudiantil en entornos virtuales, el aprendizaje, el compromiso académico y las posibilidades de acreditar las asignaturas.

Por ello, este estudio permite reconocer que la permanencia en la educación mediada por TIC exige acciones institucionales integrales, como el fortalecimiento de la conectividad, apoyos tecnológicos, diseño pedagógico más pertinente, acompañamiento tutorial y estrategias diferenciadas para estudiantes provenientes de comunidades rurales o de contextos vulnerables.

5. Conclusión

La presente investigación permitió identificar que la ausencia de estudiantes del área de Informática en clases virtuales universitarias estuvo asociada a una combinación de factores personales, económicos, pedagógicos y técnicos. Entre los más relevantes destacaron la necesidad de trabajar, la sobrecarga de tareas, la dificultad para comprender las explicaciones, el estrés frente al uso prolongado de la computadora, la mala conexión a internet, la falta de este servicio en casa, el gasto de datos móviles y la carencia de equipos de cómputo.

En relación con las preguntas de investigación planteadas, los resultados permiten señalar que los principales motivos personales asociados con la ausencia de los estudiantes en clases virtuales fueron la necesidad de trabajar, particularmente en actividades del campo, la sobrecarga de tareas, la dificultad para comprender las explicaciones, la exposición a demasiada información y el estrés derivado del tiempo prolongado frente a la computadora.

Asimismo, las condiciones técnicas más relevantes estuvieron relacionadas con la mala conexión a internet, la falta de servicio en el hogar, el gasto de datos móviles al conectarse mediante el teléfono celular, la carencia de equipo de cómputo y algunos problemas vinculados con el acceso o funcionamiento de las plataformas digitales.

En conjunto, estos hallazgos muestran que la ausencia estudiantil se asoció con una combinación de condiciones personales, económicas, pedagógicas y tecnológicas que limitaron la participación continua de los estudiantes procedentes de contextos vulnerables.

Estos resultados muestran que la inasistencia en entornos virtuales no debe interpretarse como un hecho aislado ni como un problema atribuible exclusivamente al estudiante. Por el contrario, se trata de una manifestación de desigualdades persistentes en el acceso tecnológico, en las condiciones socioeconómicas y en las formas de organización pedagógica de la enseñanza mediada por TIC.

En particular, los estudiantes procedentes de comunidades rurales o con recursos limitados enfrentan mayores barreras para sostener una participación continua en este tipo de modalidades, lo cual se asocia con un menor rendimiento académico y con un mayor riesgo de reprobación.

En consecuencia, las instituciones de educación superior deben asumir que el uso de plataformas digitales, por sí solo, no garantiza inclusión ni continuidad educativa. Se requiere diseñar estrategias de apoyo que consideren la diversidad de contextos del estudiantado, fortalezcan la accesibilidad tecnológica y promuevan prácticas docentes más claras, flexibles y centradas en las necesidades reales de los estudiantes.

En términos teóricos, el estudio muestra la utilidad de analizar el ausentismo estudiantil desde un enfoque de brecha digital multidimensional, porque permite distinguir entre problemas de acceso, dificultades de uso académico de la tecnología y factores motivacionales o de participación. Esta organización contribuye a interpretar los resultados sin atribuir la ausencia únicamente a la voluntad del estudiante y permite reconocer la relación entre vulnerabilidad educativa, desigualdad tecnológica y permanencia en la educación superior virtual.

Más que una problemática circunstancial, la ausencia estudiantil en clases virtuales constituye un reto vigente para la educación superior, cuya atención resulta indispensable para favorecer trayectorias académicas más equitativas en escenarios de aprendizaje mediados por tecnologías.

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The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

Data supporting the findings of this study are available upon reasonable request.

ETHICS STATEMENT

This study involved human participants. Participation was voluntary and based on informed consent. Prior to completing the questionnaire, participants were informed about the academic purpose of the study, the confidential use of the information collected, and their

right to decline participation or discontinue the survey without any academic consequences. No personally identifiable information was collected, and all results are reported in aggregated and anonymous form. The study was conducted in accordance with the principles of confidentiality, anonymity, and data protection.

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Impacto de la facturación electrónica en el cumplimiento tributario en empresas de quito

Impact of e-invoicing on tax compliance in quito companies

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Resumen

Se evidenció el impacto de la facturación electrónica en las empresas Páez, Florencia & Co. Cía. Ltda. y GMA Mosquera Aulestia S.A.S., a través de la aplicación de encuestas, se evaluó la compatibilidad operativa y la disposición del personal frente a la transformación digital. Los datos demográficos, reflejan que los encuestados se encuentran en un rango de edad entre 26 y 39 años, lo que revela una población con diversas habilidades, capacidades y experiencia tecnológicas, que limita la capacidad de adaptarse al cambio, los principales hallazgos encontrados son: se observa en los datos que el 83.87% de los encuestados consideran que la facturación electrónica mejora la calidad de las operaciones, el 51.61% de los encuestados afirma que la adopción a este nuevo mecanismo fue impulsado por la normativa legal y tributaria, emitida por el ente regulador y se pudo evidenciar que la presión de los competidores no es un factor que determina o un motor significativo para la implementación de la facturación electrónica. Una oportunidad de mejora fue en el conocimiento interno donde alrededor del 30% de los encuestados indicaron que se puede invertir en capacitación y obtener más conocimiento con ello reforzar el dominio y optimizar los procesos.

Palabras clave: Facturación electrónica, cumplimiento tributario, sistemas contables, transparencia fiscal

Abstract

The impact of electronic invoicing on the companies Páez, Florencia & Co. Cía. Ltda. and GMA Mosquera Aulestia S.A.S. was evidenced, through the application of surveys, the operational compatibility and the disposition of the personnel in the face of digital transformation were evaluated. The demographic data reflect that the respondents are in an age range between 26 and 39 years, which reveals a population with diverse skills, abilities and technological experience, which limits the ability to adapt to change, the main findings found are: it is observed in the data that 83.87% of the respondents consider that electronic invoicing improves the quality of operations, 51.61% of respondents stated that the adoption of this new mechanism was driven by the legal and tax regulations, issued by the regulatory entity and it was evident that pressure from competitors is not a determining factor or a significant driver for the implementation of electronic invoicing. An opportunity for improvement was in internal knowledge, where about 30% of respondents indicated that they can invest in training and obtain more knowledge, thereby strengthening mastery and optimizing processes.

Keywords: Electronic invoicing, tax compliance, accounting systems, tax transparency

1. INTRODUCCIÓN

La evolución de las administraciones tributarias a escala global estuvo caracterizada por una rápida transición hacia la digitalización, proceso que tuvo como objetivo no solo modernizar la gestión pública, sino también fortalecer los mecanismos de control frente a problemáticas como la evasión y el fraude fiscal. En el caso ecuatoriano, esta transformación fue promovida por el Servicio de Rentas Internas (SRI), institución que implementa y consolida diversas herramientas tecnológicas orientadas a mejorar la fiscalización y la trazabilidad de las operaciones económicas. En este escenario, la facturación electrónica dejó de ser una alternativa operativa para convertirse en un requisito técnico esencial dentro del funcionamiento del ecosistema empresarial.

Sin embargo, esta migración tecnológica no ha estado exenta de complicaciones. A pesar de que la digitalización optimiza la recaudación y reduce errores manuales, muchas organizaciones han enfrentado barreras significativas durante su implementación. Problemas como el acceso limitado a infraestructura tecnológica, la falta de capacitación del talento humano y la vulnerabilidad en el manejo de datos personales han generado brechas operativas que afectan especialmente a las pequeñas y medianas empresas.

Como también es importante destacar que los modelos como el brasileño, con más de 5.000 jurisdicciones municipales y normativas estatales divergentes, imponen una carga administrativa que compromete la competitividad empresarial.

Ante este escenario, surge la necesidad de investigar cómo este cambio normativo y técnico incide directamente en el cumplimiento tributario y en la salud financiera de las compañías. La presente investigación se enfoca en analizar esta transición mediante el estudio de casos específicos en la ciudad de Quito, permitiendo diagnosticar tanto los beneficios en eficiencia como los riesgos operativos derivados de la automatización contable.

2. REVISIÓN DE LA LITERATURA, HIPÓTESIS Y PLANTEAMIENTO DEL MODELO

2.1 CONTEXTUALIZACIÓN Y CONCEPTOS FUNDAMENTALES

Para comprender el impacto de la facturación electrónica, es imperativo definirla bajo la óptica del ente regulador. Se concibe como una modalidad de emisión de comprobantes de venta, retención y documentos complementarios que, mediante la incorporación de una firma electrónica, garantiza la autenticidad e integridad de la información reportada al SRI. Este mecanismo permite que el registro contable sea más preciso al facilitar la transferencia automatizada de datos entre el contribuyente y la autoridad fiscal.

Más allá de un simple reemplazo del papel, la incorporación de este sistema representó una reforma estructural en la gestión de datos financieros, permitiendo una trazabilidad sin precedentes de las transacciones comerciales. No obstante, este salto tecnológico no estuvo exento de fricciones para el ecosistema empresarial; surgieron desafíos complejos en cuanto a la interoperabilidad de sistemas, la integridad de la información y la brecha de conocimientos en el talento humano. Para diversas organizaciones, la velocidad de los cambios normativos generó disrupciones operativas que pusieron a prueba su capacidad de cumplimiento y su eficiencia administrativa.

Bajo este contexto, la presente investigación se centró en examinar el impacto real de la facturación electrónica en dos empresas objeto de estudio ubicadas en Quito. Tomando como referencia a las empresas Páez, Florencia & Co. Cía. Ltda. y GMA Mosquera Aulestia S.A.S., se pretendió diagnosticar cómo la automatización de comprobantes influyó en la estabilidad financiera y en la observancia de las obligaciones fiscales.

El estudio permitió identificar tanto las ventajas competitivas derivadas de la modernización como los riesgos operativos propios de una transición que, en muchos casos, resultó forzada o carente de una fase de adaptación técnica adecuada.

En el plano académico global, existe un consenso sobre cómo la digitalización tributaria actúa como un catalizador de sostenibilidad. Investigaciones como las de Tiwari et al. (2023) subrayar que este proceso es vital para la transformación de las cadenas de suministro. Sin embargo, se evidenció que el éxito de tales innovaciones depende de la "compatibilidad tecnológica": si el sistema impuesto colisionaba con la cultura o la infraestructura previa de la empresa, la percepción del usuario se tornaba negativa, entorpeciendo la implementación.

En términos de gestión de riesgos, si bien el SRI logró optimizar la fiscalización mediante cruces masivos de datos, para las empresas esto supuso una mayor vulnerabilidad ante sanciones, especialmente cuando sus procesos internos no lograron alinearse con la rapidez de las reformas.

Edicom afirma que (2026):

> Brasil cuenta con uno de los sistemas fiscales más complejos del mundo, estructurado en tres niveles (federal, estatal y municipal), y compuesto por normativas específicas en los 26 estados y más de 5.000 municipios. Esta diversidad legislativa genera una elevada carga administrativa y tributaria para las empresas, especialmente en las operaciones entre estados y municipios. La burocracia fiscal obliga a las compañías a destinar importantes recursos al cumplimiento, afectando su competitividad y eficiencia operativa.

Como bien indica EDICOM (2026), el esfuerzo requerido para cumplir con las normativas impacta drásticamente la eficiencia corporativa. Por lo tanto, se evidencia que la arquitectura fiscal de un país puede actuar como un factor negativo si la carga de cumplimiento supera los rubros óptimos de gestión interna.

2.3 Análisis de la situación problemática y el problema identificado

El nudo crítico que motivó esta investigación residió en las dificultades técnicas que enfrentaron las compañías durante la migración obligatoria al esquema electrónico. En Ecuador, la implementación vertical del SRI no siempre sopesó las disparidades en el dominio digital ni la capacidad económica de todos los contribuyentes. Esto derivó en fallas sistemáticas en la emisión y validación de documentos, afectando la operatividad diaria.

De manera específica, en los casos de Páez, Florencia & Co. Cía. Ltda. y GMA Mosquera Aulestia S.A.S., se detectó que la falta de una integración fluida entre sus sistemas contables heredados y la plataforma del SRI impactó negativamente en su rendimiento. Esta desconexión no solo entorpece la administración, sino que facilita errores en el cumplimiento de plazos para la anulación de comprobantes. Según lo estipulado en las resoluciones NAC-DGERCGC25-00000014 y NAC-DGERCGC25-00000017, la rigidez de los nuevos tiempos para gestionar anulaciones en línea exige un nivel de especialización que el personal contable no siempre alcanzó a desarrollar por falta de instrucción técnica oportuna. Además, la ausencia de protocolos de seguridad robustos, alineados con la Ley de Protección de Datos, dejó expuesta la información sensible, incrementando el riesgo de contingencias legales.

2.4 Objetivos de la investigación y justificación del análisis

Frente a este panorama, el objetivo general del estudio consistió en analizar de manera integral cómo la facturación electrónica repercutió en el cumplimiento tributario y la agilidad

operativa de las empresas mencionadas, utilizando sus propios registros históricos para desglosar las fallas en el proceso. No se buscó únicamente señalar los obstáculos, sino proyectar soluciones que ayudarán a neutralizar los riesgos detectados.

Para dar estructura a este análisis, se trazaron los siguientes objetivos específicos:

- Examinar el marco teórico y normativo que rige la facturación electrónica en el sistema legal ecuatoriano actual.
- Evaluar el estado de cumplimiento fiscal y su efecto directo en los flujos documentales de las entidades bajo estudio.
- Proponer un esquema técnico basado en el análisis contable que funcione como estrategia de mitigación frente a brechas de seguridad y manejo de datos.
- Corroborar la validez de los hallazgos mediante la consulta a expertos en las áreas tributaria y contable.

La investigación se justificó por su utilidad práctica para los casos estudiados en Quito, ofreciendo herramientas para que las organizaciones no sólo eviten sanciones, sino que capitalicen la digitalización como una ventaja estratégica. Al perfeccionar los procesos internos, las empresas logran una gestión más transparente y responsable, cumpliendo con las exigencias estatales sin comprometer su viabilidad operativa.

3. METODOLOGÍA

Para comprender el impacto de la implementación de la facturación electrónica la investigación se aplicó en las empresas Páez, Florencia & Co. Cía. Ltda. y GMA Mosquera Aulestia S.A.S., dónde se identificó sus efectos dentro de los sistemas contables y el cumplimiento ante las obligaciones tributarias.

Según Arias (2021) menciona que:

> El investigador debe estar en el sitio o lugar a investigar y debe establecer una relación con las personas que conforman dicho grupo, la información se recoge a partir de instrumentos como bitácoras, registros anecdóticos, lista de corroboración, guía de observación, entre otros. (p. 90)

La investigación posee un enfoque cuantitativo descriptivo, el cual se centró en el estudio de fenómenos observables mediante la recolección y el análisis de datos cuantitativos y cualitativos. Se utilizaron técnicas estadísticas y matemáticas para interpretar la información y establecer relaciones entre los datos. Asimismo, la medición facilitó la vinculación entre la observación y el marco conceptual del estudio, y los datos obtenidos a través de encuestas y revisión documental permitieron sustentar y validar los resultados alcanzados.

La investigación descriptiva, se desarrolló para comprender las experiencias, opiniones y conceptos que permitió analizar la situación de la implementación de la facturación electrónica, identificando su incidencia en los sistemas contables, por ello se examinaron las percepciones del personal contable respecto a los beneficios obtenidos, como las dificultades y limitaciones presentadas ante la integración de los comprobantes electrónicos con la plataforma del SRI, por eso McCombones (2023) dice que “La investigación descriptiva es una opción apropiada cuando el objetivo de la investigación es identificar características, frecuencias, tendencias y categoría”. Se obtuvo una visión integral del impacto de la facturación electrónica en las empresas objeto de estudio y todo ello fue mediante la caracterización y adopción del análisis del cumplimento tributario.

La población fueron las empresas registradas en el INEC, el muestreo realizado fue no probabilístico intencional Stewart afirma que “El objetivo clave del muestreo intencional es

obtener una comprensión profunda de los fenómenos desde una perspectiva específica o dentro de un contexto específico". Debido a que la selección de las empresas se realizó considerando criterios específicos relacionados con la accesibilidad y la relevancia. Según Biz Latin Hub (2024) afirma que "La Ley de Sociedades del Ecuador reconoce cinco tipos distintos de sociedades que pueden constituirse en el país. Cada uno de ellos tiene una finalidad distinta y satisfará diferentes objetivos".

La facturación electrónica es una herramienta por lo que Pérez et. al (2021) menciona que "En la actualidad, las tecnologías emergentes permiten el desarrollo de nuevos casos de uso y aplicaciones que con el rendimiento de las redes y tecnologías existentes no son eficientes cuando se trata de racionalizar los procesos" (p.14). En este sentido es relevante recalcar que indagar y observar a las empresas objeto de estudio son técnicas que favorecen ya que se pudo evidenciar tendencias.

En cuanto a la técnica de encuesta, fue el instrumento principal para la recolección de datos primarios a través de un cuestionario estructurado y validado con base en Tiwari et al. (2023) autores del artículo "Determinants of electronic invoicing technology adoption: Toward managing business information system transformation" publicado en la base de datos Scopus (Q1) dentro del Journal of Innovation & Knowledge.

Y posteriormente García (2016) afirma que:

> Para poder realizar cualquier análisis estadístico se requiere primeramente definir cuál es la población que será objeto de estudio. La población es el conjunto de elementos que tienen una característica común que es observable y acerca del cual queremos realizar determinados estudios. (p.130)

Se realizó el procesamiento estadístico en SPSS, el instrumento antes mencionado se aplicó a través de Formularios de Google, específicamente al total de 31 empleados que trabajan en los departamentos contables de las empresas Páez, Florencia & Co. Cía. Ltda. y GMA Mosquera Aulestia S.A.S., seleccionando a contadores, auxiliares y financieros por su rol estratégico, debido a que poseen el conocimiento operativo necesario para evaluar los obstáculos de la facturación electrónica. Se complementó con la técnica de observación que consistió en la revisión documental tributaria de las empresas objeto de estudio permitió la verificación del cumplimiento tributario.

Dziak (2020) afirma que:

> El Modelo de Aceptación de la Tecnología (TAM, por sus siglas en inglés) es un marco teórico diseñado para predecir la probabilidad de que individuos u organizaciones adopten nuevos sistemas tecnológicos. Desarrollado por Fred Davis en la década de 1980, el modelo surgió en respuesta a la preocupación por la resistencia de las personas a la tecnología y el frecuente bajo rendimiento o el fracaso absoluto de los nuevos sistemas. El TAM postula que las características de un sistema tecnológico influyen en la motivación de los usuarios potenciales para adoptarlo. Esta motivación se ve afectada principalmente por dos factores clave: la facilidad de uso y la utilidad percibidas.

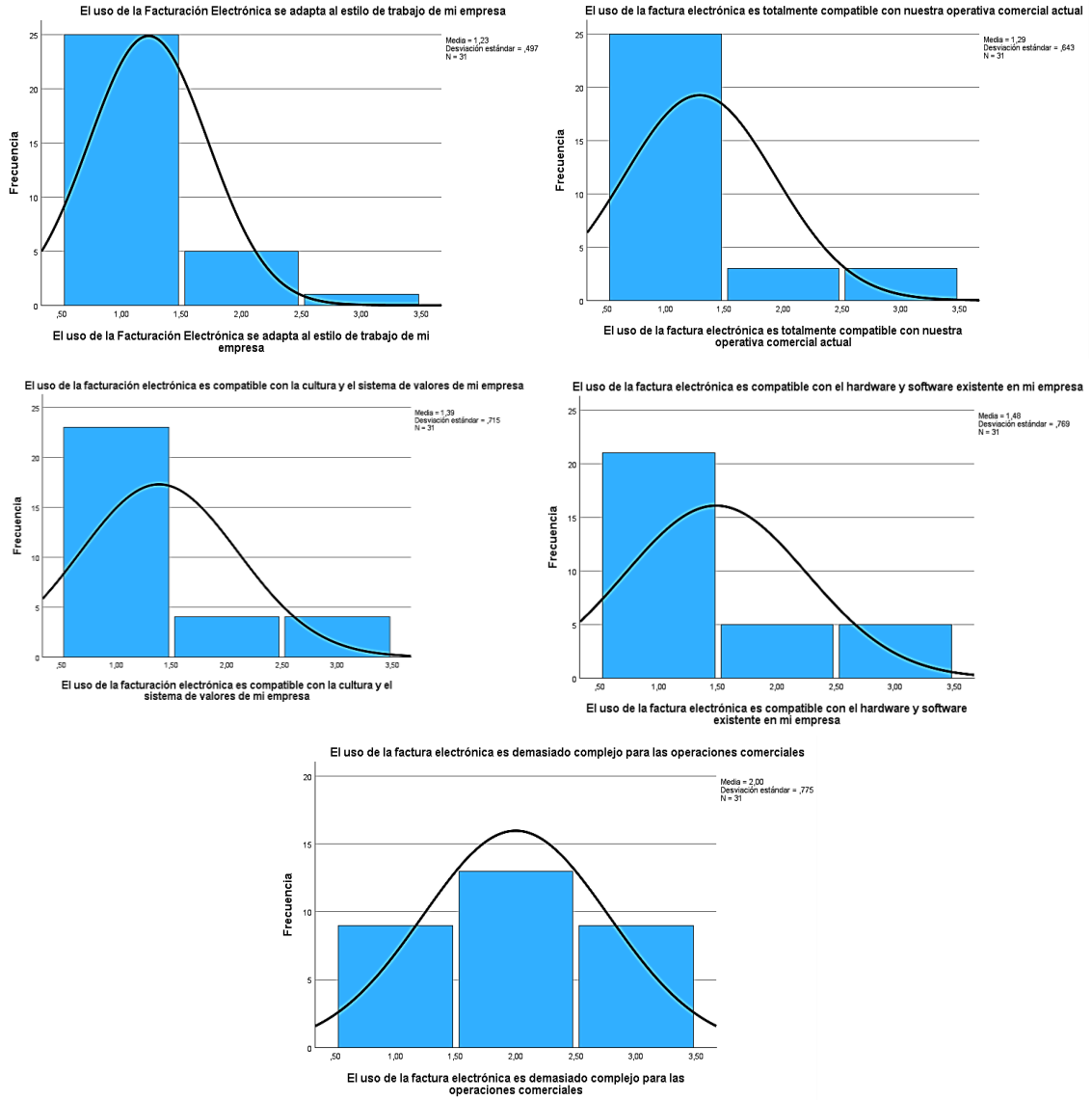
Como señala Dziak (2020), el modelo TAM la adopción tecnológica está condicionada por la facilidad de uso y la utilidad percibida del sistema. En consecuencia, este modelo permite diagnosticar dificultades operativas reportadas por las compañías, generadas por deficiencias estructurales del software o a una percepción desfavorable del personal encargado del procesamiento diario de la información tributaria.

4. Resultados – Discusión

En esta sección se presentan los resultados y el análisis de las encuestas realizadas a un total de 31 empleados del área financiera de las empresas Páez, Florencia & Co. Cía. Ltda. y GMA Mosquera Aulestia S.A.S.

4.1 Sección Percepción de Compatibilidad y Complejidad (Factores Tecnológicos)

Figura 1 - *Distribución de respuestas sobre compatibilidad tecnológica, n=31*



Nota. Figura 1 se consolida los histogramas obtenidos por el sistema SPSS.

Los resultados obtenidos a través de procesar los datos por el SPSS indicaron que se mantiene una aceptación considerable en la implementación de la facturación, con lo que se pudo evidenciar que para los encuestados el uso de la facturación electrónica es adaptable a su estilo de trabajo, compatible con la operatividad comercial, asimismo los resultados indican una transición tecnológica fluida, y una alineación positiva con los sistemas de las compañías que formaron parte del estudio, sin embargo se observó que en cuanto a la complejidad del uso de la facturación electrónica los encuestados respondieron de forma neutral, es decir aún no se mantiene un dominio total de este nuevo mecanismo de facturación en las operaciones comerciales de las empresas.

En este sentido Ugwo et. al (2022) argumentan que:

> La adopción de sistemas de facturación electrónica en las pequeñas y medianas empresas está influenciada por factores como la infraestructura tecnológica disponible, la facilidad de uso del sistema y la compatibilidad con las prácticas empresariales actuales, lo cual favorece la aceptación de la tecnología por parte de los usuarios. (p.4)

Por lo tanto, la facturación electrónica ha contribuido de manera significativa al fortalecimiento del cumplimiento tributario a mejorar el control y registro de las transacciones contables, en este sentido podrían determinar un incremente en las ventas en los todos los sectores facilitando el cumplimiento fiscal.

En este sentido Dueñas et. al (2025) argumentan que:

> Los estudios analizados en esta revisión sistemática evidencian que la implementación de la facturación electrónica ha generado un impacto positivo y significativo en el fortalecimiento del cumplimiento tributario en diversos contextos geográficos y económicos. En el caso específico de Perú, otra investigación [11] demostró que la adopción obligatoria del sistema de facturación electrónica incrementó en más de un 5 % las ventas, compras y obligaciones fiscales reportadas por las empresas, con efectos más notorios en las pequeñas y medianas empresas, así como en sectores caracterizados por una baja formalización, como la construcción y los servicios empresariales. (p. 23)

Con este argumento, se determinó que la transformación digital de los procesos contables y comerciales, permitieron reducir costos operativos, mejorar la trazabilidad de la información y optimizar la eficiencia en la gestión empresarial.

Según Becerril et. al (2025) afirma que:

> Los principales beneficios de la facturación electrónica es el ahorro de costos de logística, control de archivos, elaboración de comprobante físico, entre otros. Las estrategias implementadas tienen relación con la familiarización de una cultura tributaria para que los microempresarios, emprendedores y pymes puedan aplicar la tecnología en su gestión como principal herramienta de control tributario, siendo más competitivas. (p. 2320)

La facturación electrónica ha pasado a ser mucho más que una obligación legal, convirtiéndose en un recurso clave para las empresas, ya que permite agilizar sus procesos internos, disminuir gastos y llevar un mejor control de sus obligaciones tributarias.

Se observó una tendencia positiva en cuatro de las cinco preguntas analizadas, lo que evidenció una alta disposición técnica y cultural hacia el sistema, sin embargo, se determinó que el uso de la facturación electrónica es complejo para las operaciones comerciales, es decir este nuevo mecanismo de facturación se encuentra establecido, pero aún mantiene algunos desafíos para su total ejecución.

Según Bojanc et. al (2024) menciona que:

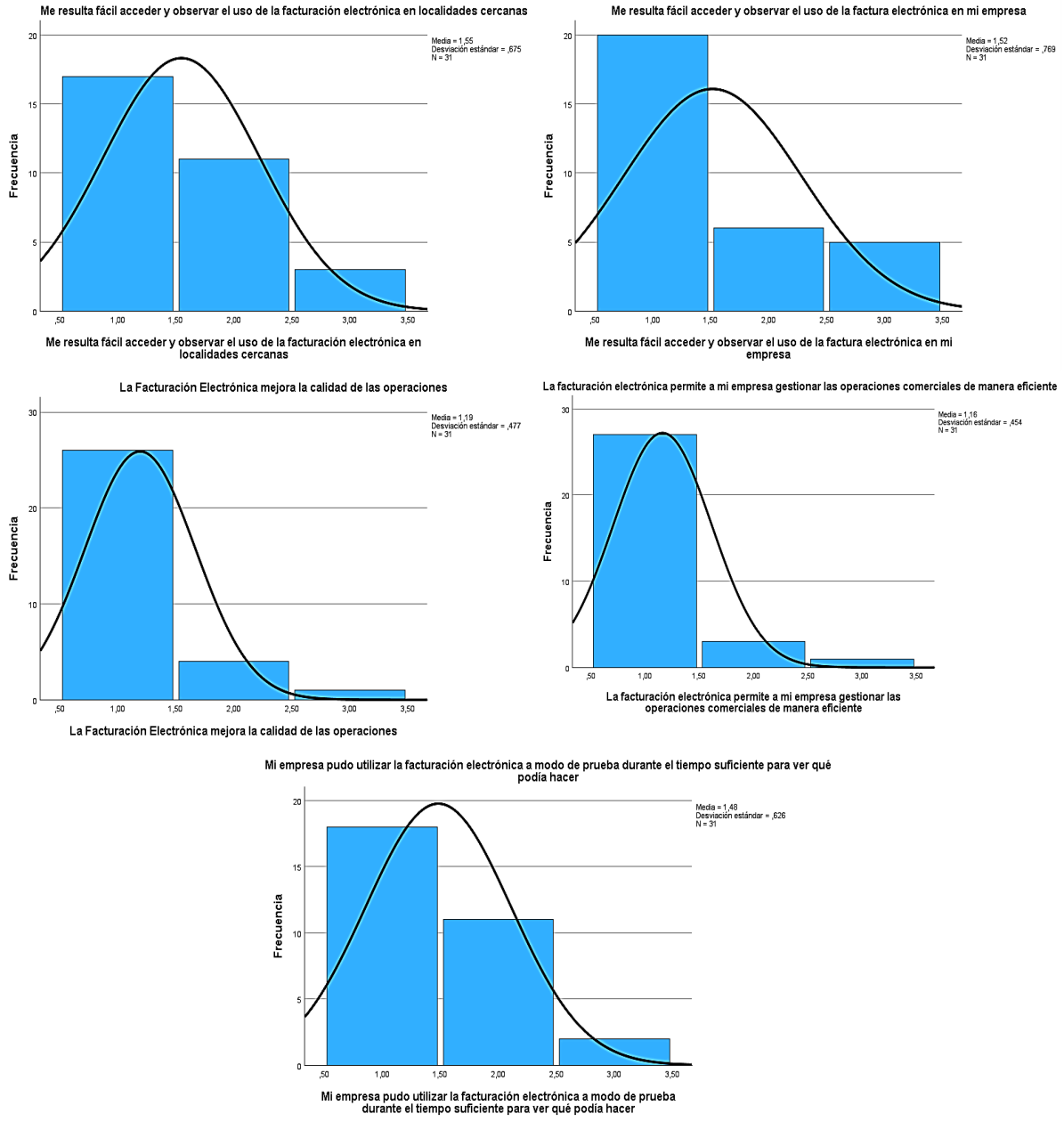
> La digitalización ofrece un amplio abanico de oportunidades para la transformación digital y sostenible. Uno de los primeros pasos en este camino es la digitalización de los documentos y procesos empresariales. La Comisión Europea ha reconocido las ventajas de la digitalización, especialmente en el contexto de la facturación electrónica, que puede contribuir significativamente a la prosperidad económica y alinearse con objetivos de política pública como la reducción del déficit y el desarrollo sostenible. (p. 3)

El autor confirma que la implementación de la facturación electrónica facilita los procesos operativos, permitiendo la transformación hacia caminos donde la digitalización puede

alinearse a los objetivos de las empresas, con el fin de aprovechar las ventajas que genera la documentación electrónica.

4.2 Sección Visibilidad y Observabilidad

Figura 2 - *Distribución de respuestas sobre visibilidad y observabilidad, n=31*



Nota. Figura 2 se consolida los histogramas obtenidos por el sistema SPSS.

Los resultados obtenidos a través de procesar los datos por el SPSS indicaron de forma unánime estar de acuerdo en que si existieron beneficios operativos de la facturación electrónica independientemente de la ubicación en el que se encuentre el usuario, de acuerdo a lo que muestra los resultados de la encuesta la facturación electrónica es fácil de utilizar, por lo cual no existieron dificultades para la transición tecnológica porque se desarrolló a través de un proceso controlado y esto generó resultados favorables para las empresas, lo que sugiere es que la digitalización de los procesos administrativos faciliten el control de la información, reduciendo y optimizando los tiempos de gestión. Estos

resultados pueden ser influenciados por la digitalización empresarial, uso de las plataformas digitales, regulaciones fiscales y el beneficio asociado a la automatización de los procesos.

Según Sutisna et. al (2024) afirma que:

> Esta investigación tiene como objetivo identificar los beneficios de la facturación electrónica (E-Invoicing) para mejorar la eficiencia operativa y explorar los desafíos que se enfrentan durante el proceso de implementación. Al comprender estos aspectos, se espera que la empresa esté mejor preparada para adoptar la facturación electrónica y obtener los beneficios de la transformación digital que ofrece. (p. 428)

Para una transición tecnológica controlada estos resultados afirman lo planteado por Sutisna et al. (2024), los beneficios y desafíos del E-Invoicing son importantes para que las empresas alcancen la eficiencia operativa deseada. Por lo tanto, los resultados muestran que la digitalización de los procesos administrativos contribuye a la reducción de tiempos de gestión y un control de la información.

En este sentido, López et al. (2021) sostienen que:

> la facturación electrónica ha sido promovida como una herramienta clave para reducir la evasión fiscal en Ecuador, muchas PYMEs enfrentan dificultades técnicas y operativas para adoptarla de manera efectiva. Estas dificultades incluyen costos asociados con la adquisición de software adecuado, falta de acceso a una infraestructura tecnológica confiable y una escasa capacitación en el uso de sistemas digitales. Como resultado, una parte significativa de las transacciones de este sector continúa siendo informal, lo que reduce el impacto esperado en la disminución de la evasión fiscal.

La adopción de la facturación electrónica representa un elemento estratégico de cumplimiento tributario que fortalece la gestión empresarial permitiendo mejorar los registros, cumpliendo con las obligaciones tributarias. Estos elementos evidencian que la digitalización de los procesos de facturación constituye un factor clave para mejorar la competitividad y la transparencia en la gestión empresarial.

Según Arias et. al (2025) afirma que:

> La transformación digital en la administración tributaria, especialmente mediante la facturación electrónica, está revolucionando la eficiencia, la transparencia y el cumplimiento fiscal. En este sentido, la literatura sistemática reciente subraya cómo estas tecnologías simplifican los procesos, reducen costos y mejoran la trazabilidad de las operaciones contables y fiscales.

En conclusión, la facturación electrónica forma una herramienta clave en la transformación digital del sistema tributario, ya que optimiza procesos, fortalece la transparencia y mejora el cumplimiento fiscal.

Como resultado del análisis de los datos, se observó que la implementación de la facturación electrónica mejora la calidad de las operaciones y se puede ingresar a obtener información actualizada

Chengyan et al. (2023) menciona que:

> Estudios previos sobre la adopción de tecnologías de consumo se han centrado principalmente en dos aspectos: (1) evaluar el beneficio a largo plazo de la adopción y (2) investigar los procesos de toma de decisiones de los consumidores al considerar la adopción de una nueva tecnología. Los estudios sobre los beneficios a largo plazo de la adopción han abordado predominantemente el uso de energía y han examinado cuánto se beneficia la

> adopción de la tecnología y si ha habido una inversión insuficiente en tecnologías que ahorran energía.

La implementación de una herramienta tecnológica es una gran inversión que las empresas realizan, no solo a corto plazo, sino que las evidencias indicaron los beneficios a largo plazo, por ello se pudo revisar que en la sección de visibilidad y observabilidad los colaboradores se encuentran de acuerdo y satisfechos con la facturación electrónica, y con ello se puedo determinar que si son necesarias realizar mejoras con la finalidad de cumplir con las exigencias del ente de control.

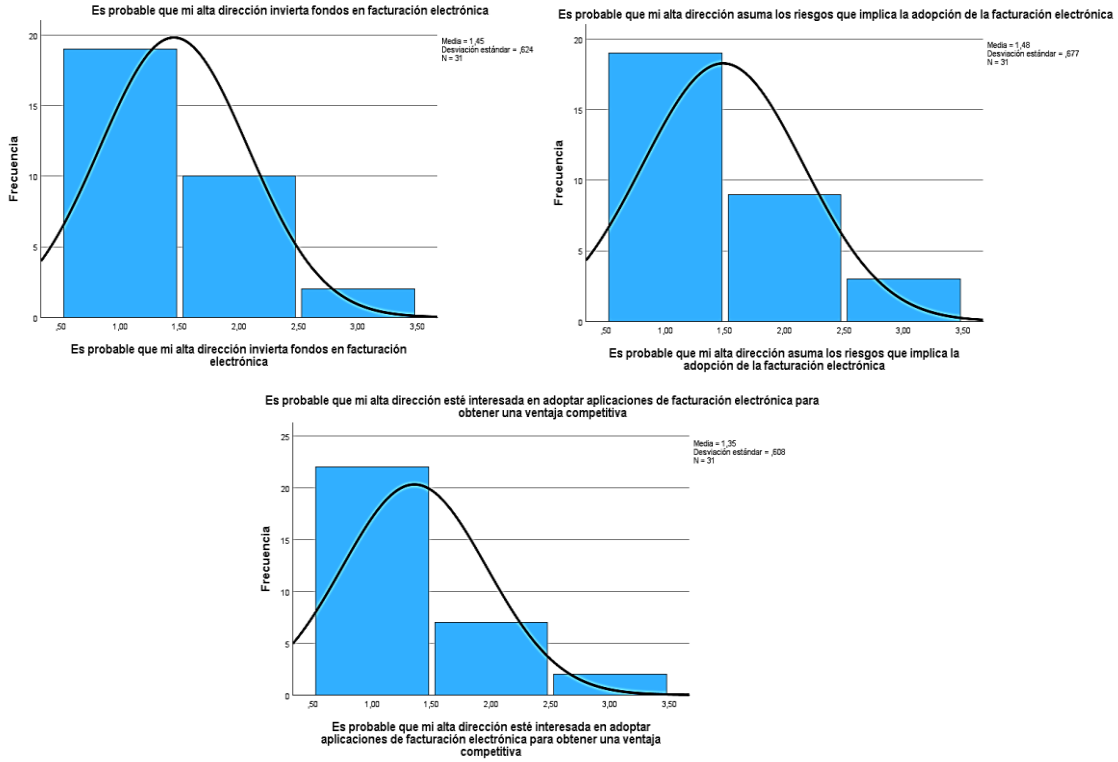
Según Tosca et. al (2021) determina que:

> La facturación electrónica como esta misma que empezó siendo una nueva iniciativa para un mejor control por parte de las autoridades fiscales en el tema de la evasión se convirtió en una herramienta para mejorar la productividad y la eficacia, ya que se hacen en un menor tiempo a como se hacían de manera tradicional y se ven reflejadas casi de inmediato para el contribuyente al que se le realice, gracias a ello ha ido generando un gran impacto para los que la realizan este tipo de documentos ya que han mejorado en diferentes aspectos como lo es la seguridad de saber que es un documento legal y valido ante las autoridades.

La digitalización ha ido avanzando hasta convertirse en una herramienta completa que no solo permite un mejor control fiscal, sino que también facilita las operaciones diarias, asegura la validez legal de los documentos y contribuye a una gestión de la información más ágil y clara dentro de las organizaciones.

4.3 Sección Apoyo de la Alta Dirección y Visión Estratégica

Figura 3 - *Distribución de respuestas sobre apoyo de la alta dirección y visión estratégica, n=31*



Nota. Figura 3 se consolida los histogramas obtenidos por el sistema SPSS.

Los resultados obtenidos a través de procesar los datos por el SPSS indicaron de forma unánime estar de acuerdo en que la alta gerencia está dispuesta a invertir fondos para facilitar la adaptación a la facturación electrónica, es decir la alta dirección es consciente que por medio de esta transición tecnológica se observa que la toma de decisiones se encuentra orientada a tener una ventaja competitiva en el mercado.

Según Alsmairat et. al (2022) establece:

> Diversos estudios recientes han señalado que el compromiso de la alta dirección constituye uno de los principales determinantes para la adopción exitosa de tecnologías digitales en las organizaciones, ya que facilita la asignación de recursos, la reducción de la resistencia al cambio y la implementación de estrategias de transformación digital. (p. 1447)

Se evidenció que existe una alineación estratégica por parte de la alta gerencia para financiar la transición hacia la facturación electrónica, esto muestra el compromiso de adaptación a la emisión de comprobantes electrónicos. Como también se determinó que para la transformación digital de la organización se requirió de la asignación eficiente de recursos, con la finalidad de mitigar la resistencia al cambio institucional.

Según Arias et. al (2021) menciona que:

> Para ello también se realizó una encuesta en donde se requiere conocer la opinión de los funcionarios específicamente de aquellos que están involucrados en los cambios generados debido a la facturación electrónica, en donde se ha podido llegar a resumir que gracias a la misma la búsqueda de un documento es mucho más fácil, el ahorro que se obtiene a la hora de almacenar el mismo y el tiempo al momento de preparar la información para el cumplimiento respectivo con las obligaciones tributarias, para lo cual se ha disminuido de forma notable errores de contenidos en el documento, declaraciones sustitutivas, anulación de documentos y sanciones económicas por parte de la Administración Tributaria. (p.83)

Desde la perspectiva organizacional se observó que la empresa no dispone de ningún limitante que le impida tomar decisiones encaminadas en efectuar cambios tecnológicos con la finalidad de beneficiarse con el uso de este mecanismo de facturación, adicionalmente cabe destacar que, al disponer de esta información en medio electrónico, resulta más fácil acceder a la información de manera inmediata.

Se observó que Granados et. al (2024) afirma que "persiste la tendencia que, si genera un aporte positivo para el cuestionamiento planteado, lo que indica que el uso del sistema de facturación electrónica ha mejorado la transparencia y la trazabilidad de las transacciones comerciales" (p. 1095).

Por lo tanto, se evidenció que la adopción de un adecuado sistema de facturación se considera fundamental para determinar que toda la información se integre, y así contribuya a que a través de este medio se informe plenamente al ente de control.

Se evidenció que los colaboradores tienen presente que la alta dirección mantiene la predisposición de implementar mejoras que faciliten la facturación electrónica, conforme a los procesos definidos dentro de la compañía independientemente de los riesgos que se generen en el desarrollo de la adaptación.

Según Medina (2021) menciona que:

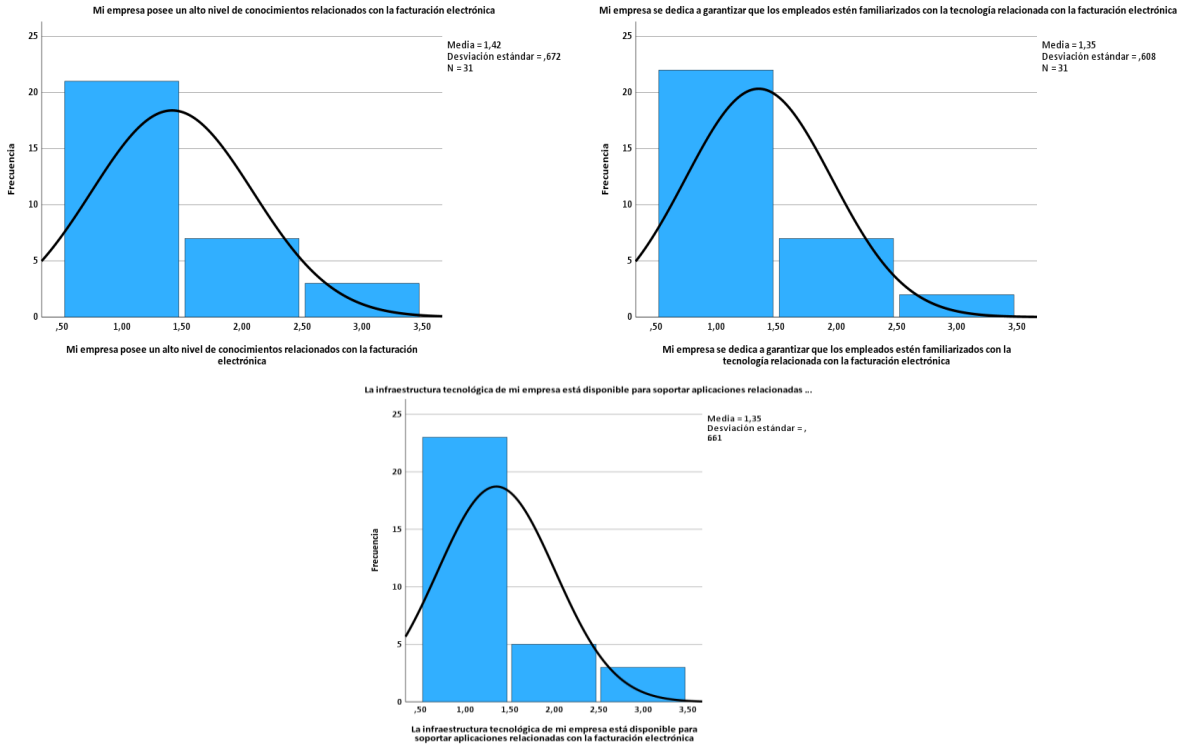
> El estudio de Visión Pymes 2020, el 80 % de las pymes en Ecuador se centra en innovar y resolver problemas. En función de eso se considera que soluciones como la facturación

electrónica se han convertido en herramientas prácticas y beneficiosas para los empresarios que desean reactivar su economía a través de los nuevos canales de ventas digitales.

En las empresas encuestadas se evidenció que los altos directivos se enfocaron en que los sistemas se encuentren actualizados para el mejoramiento de infraestructura tecnológica, y con ello se alinean a las nuevas tendencias del entorno empresarial.

4.4 Sección Recursos y Capacidades Internas

Figura 4 - *Distribución de respuestas sobre recursos y capacidades internas, n=31*



Nota. Figura 4 se consolida los histogramas obtenidos por el sistema SPSS.

Los resultados obtenidos a través de procesar los datos por el SPSS indicaron que se presenta un amplio nivel de conocimiento técnico junto a una infraestructura alineada a las exigencias que requirió este mecanismo de facturación, evidenciando que el personal si se encuentra familiarizado con la tecnología relacionada, sin embargo, se observa que existen una posición neutral en cuanto a que la empresa está bajo presión de los competidores para la adaptación a la facturación electrónica.

Este resultado sugiere una valoración general positiva sobre la preparación interna de las empresas para utilizar sistemas de facturación, lo cual favorece a los procesos administrativos y contables, así como también muestra la presión competitiva que influyó para que esta transición tecnológica se efectué en las compañías.

Ilias et. al (2025) afirma que "La adopción de la facturación electrónica no depende únicamente de factores regulatorios, sino también de las capacidades tecnológicas y organizacionales de las empresas, las cuales facilitan la integración de los sistemas digitales en los procesos administrativos y contables".

Se evidenció que las empresas analizadas presentan un nivel favorable en la implementación de la facturación electrónica, lo cual ha permitido la integración de sistemas digitales dentro de los procesos administrativos. Este resultado refleja que la adopción de

esta herramienta tecnológica no se limita únicamente al cumplimiento de las obligaciones tributarias, sino que también está influenciada por las capacidades tecnológicas y organizacionales de las empresas, las cuales facilitan la gestión eficiente de la información y contribuyen a mejorar los procesos internos.

Según Guillen et. al 2024 afirma que:

> La revisión evidencia que la facturación electrónica fortaleció el control fiscal mediante trazabilidad inmediata, verificación automatizada y procesamiento masivo de datos, contribuyendo a reducir comprobantes falsos y a un aumento del 22% en la recaudación del Impuesto a la Renta en 2022. Se observaron mejoras en declaraciones y menor incidencia de sanciones. En la gestión administrativa, se identificaron ahorros y optimización de procesos, aunque persisten brechas de capacitación e infraestructura. (p.1)

La facturación electrónica contribuye al cumplimiento normativo, de tal manera que la información financiera sea integra al momento de reportar la misma al ente regulador, como también se debe destacar que otro beneficio es la optimización de los recursos administrativos que facilitan el buen manejo de los procesos internos, minimizando el riesgo de realizar un incumplimiento que le genere alguna sanción.

Según Galarza (2023) menciona que "La implementación efectiva de la transformación digital no depende únicamente de la adquisición de tecnología avanzada, sino que también requiere un enfoque integral que incluya la gestión y el desarrollo del talento humano" (p.22).

En concordancia con lo que menciona Galarza (2023) el éxito de una transición depende en su totalidad de que el personal involucrado se encuentre capacitado para que el desarrollo de este nuevo cambio no genere mayores dificultades en el momento de la ejecución.

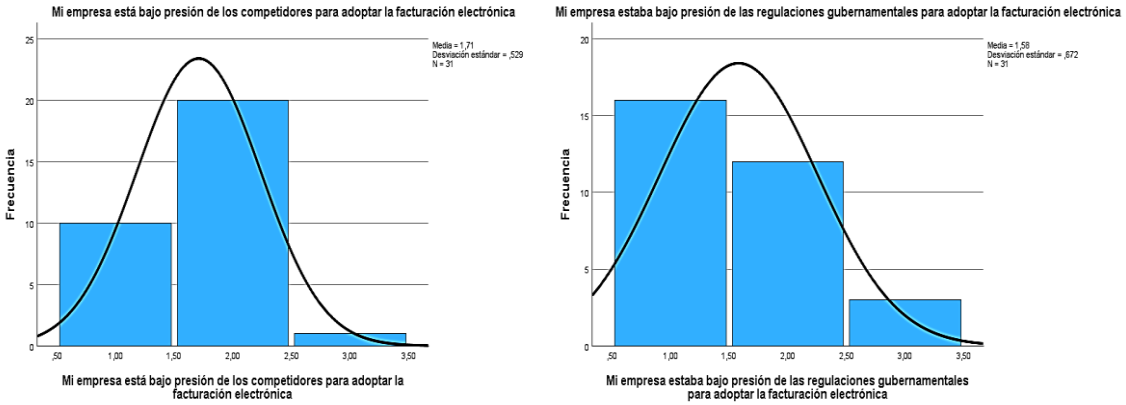
Los datos demostraron que los encuestados sienten una fortaleza en la infraestructura tecnológica y en las capacitaciones, las cuales garantizan que los colaboradores se encuentren familiarizados y con conocimientos de la facturación electrónica, en Ecuador las instituciones como el Consejo de participación ciudadana nos indica que:

Una organización con alta capacidad en esta área se caracteriza por: un buen sistema operativo que facilita el trabajo en equipo; conocer y valorar los talentos de su personal; permitir al personal utilizar y aumentar sus habilidades y conocimientos; compartir abiertamente la información importante; ofrecer al personal oportunidades oportunas y relevantes de capacitación. (p.68)

Con ello se evidenció que las instituciones del Ecuador, aseveran que el conocimiento facilita el trabajo, y las capacitaciones al personal son de alta importancia para generar el conocimiento necesario. De tal manera que los encuestados no sienten presión por la competencia, debido a que la transformación y la aplicación de la facturación electrónica son procesos que realizaron sin ninguna novedad.

4.5 Sección Marco Normativo

Figura 5 - *Preguntas de la Sección Marco Normativo*



Nota. Figura 5 se consolida los histogramas obtenidos por el sistema SPSS.

Los resultados obtenidos a través de procesar los datos por el SPSS indicaron que de forma unánime están de acuerdo en que la adaptación a la facturación electrónica fue impulsada a causa de las regulaciones gubernamentales. En consecuencia, esta transformación digital permitió que el SRI ejecute un mayor monitoreo para determinar el cumplimiento tributario en función a la normativa vigente, una proporción de los encuestados reconoce que la implementación de la facturación electrónica motivó a la necesidad de cumplir con las disposiciones legales y vigentes, este resultado refleja una tendencia favorable hacia a la aceptación de la facturación electrónica, aunque sea principalmente impulsado por externos.

Sutisna et. al (2024) afirma que "La implementación de sistemas de facturación electrónica constituye una herramienta clave para la transformación digital de los procesos contables, permitiendo mejorar la eficiencia administrativa y fortalecer la transparencia fiscal en las empresas" (p. 428).

Se identificó que el (SRI) ejerce un monitoreo más minucioso sobre el cumplimiento tributario, por lo cual el impulso inicial a esta transición tecnológica se efectuó por una imposición externa y bajo normativa, sin embargo, satisfactoriamente existe una aceptación a este nuevo cambio que permitió el alcance a una eficiencia administrativa y operativa.

Según Amoroso (2025) describe que:

> Aunque el (SRI) ha dado pasos importantes, como la implementación parcial de la facturación electrónica, su expansión a nivel nacional y la mejora en la capacitación de los contribuyentes son aspectos fundamentales que deben ser abordados para optimizar el sistema tributario. (p. 444)

De acuerdo con lo mencionado por Amoroso (2025), se debe destacar que para que el proceso de implementación genere resultados beneficiosos, es importante señalar que esto depende de la gran infraestructura técnica que disponen las compañías para adaptarse a los cambios normativos vigentes.

Según Zamora et. al (2024) afirma que:

> Se logra concluir que la aplicación de la facturación electrónica en el Ecuador y en Manta, tiene un impacto económico principalmente en las imprentas autorizadas ya que a medida que se dio el cumplimiento del cronograma establecido por el SRI, las ventas bajaron por la falta de demanda de libretines físicos (facturas) como documentos tributarios.

Si bien es cierto la facturación electrónica ha generado grandes beneficios, cabe mencionar que también la digitalización de comprobantes provocó crisis en los establecimientos que se encargaban de la emisión de comprobantes físicos autorizados, obligando a estos a buscar nuevos mercados e incluso a la liquidación de estos establecimientos. (p. 151)

Los resultados obtenidos en esta sección revelaron que el ente regulador influenció significativamente en la transición hacia la facturación electrónica, y que las políticas tributarias fueron determinantes para la adopción a este mecanismo de emisión de comprobantes.

Ramírez et al. (2020) afirma que:

> En el año 2013 el Servicio de Rentas Internas (SRI) de Ecuador lanza oficialmente a la factura electrónica como una estrategia institucional para modernizar la administración tributaria a favor de reducir la evasión y simplificar el cumplimiento a los contribuyentes. En el año 2015 se da el primer ingreso masivo de contribuyentes a este nuevo sistema. El presente estudio tiene por objetivo determinar qué efectos han generado en el cumplimiento tributario de aquellos contribuyentes que están obligados a forma parte de este nuevo sistema de control fiscal. Los resultados muestran efectos significativos sobre el cumplimiento, lo que evidencia que la Factura Electrónica en Ecuador tiene grandes perspectivas de convertirse en la estrategia central de control tributario de la administración ecuatoriana.

El ente de control efectuó grandes cambios significativos para mejorar la digitalización en los procesos e implementar en su totalidad la facturación electrónica en las empresas, en consecuencia, se evidenció que los colaboradores accedieron a esta transformación digital por la presión de las regularizaciones gubernamentales.

Análisis de facturación electrónica de la Empresa Páez, Florencia & Co. Cía. Ltda.

Del análisis comparativo entre la base de facturación y los valores declarados en el Formulario 104 de la empresa Páez, Florencia & Co. Cía. Ltda. se evidenció consistencia en los registros mensuales durante todo el año 2025. Los valores reportados en cada mes coinciden con la base de facturación generada por el sistema, con lo cual se determinó un total anual de ventas que asciende a $352.962,92, sin presentar diferencias entre la facturación y declaración de impuestos. Este resultado ha demostrado que la empresa mantuvo un adecuado manejo de información y cumplimiento tributario oportuno, así como también se evidenció que la facturación electrónica mejoró la transparencia de la información financiera presentada al ente de control.

Según León et. al (2024) afirma que:

> Los resultados sugieren que la transformación digital tiene un efecto positivo significativo sobre el beneficio por acción, particularmente cuando se controla por sector económico y periodo de tiempo, mientras que su impacto en la rigidez de la presión fiscal es también notable, indicando que las empresas con mayor grado de digitalización enfrentan una mayor presión fiscal. (p. 1)

En concordancia con lo mencionado por los autores León et. al (2024) se evidenció que la transformación digital genera beneficios siempre y cuando se mantenga establecido un buen control operativo, que a la vez permita definir correcciones a falencia de forma oportuna.

Análisis de facturación electrónica de la Empresa GMA MOSQUERA AULESTIA S.A.S.

De la revisión efectuado a la facturación de la empresa GMA Mosquera Aulestia S.A.S. se evidenció que para el año 2025 se facturó un total que asciende a $1.412.122,15, de los valores mensuales que fueron registrados en la base de facturación y en el Formulario 104, en la que se determinó que las cifras coinciden en su totalidad, demostrando que los procesos de emisión de factura y registros contables concuerdan con lo reportado al ente de control, con ello se visualizó que existe una correcta trazabilidad de la información. En este sentido el análisis refleja una adecuada gestión financiera tributaria, no obstante, es recomendable mantener revisiones periódicas para asegurar el cumplimiento tributario.

Según Calle (2025) afirma que:

> La digitalización del sistema tributario ecuatoriano representa, sin duda, un avance fundamental hacia un modelo fiscal más eficiente, transparente e inclusivo. No obstante, su éxito sostenido dependerá de la capacidad estatal para abordar los desafíos identificados, asegurar la protección de información y garantizar un acceso equitativo a los servicios digitales. Este estudio contribuye significativamente al debate académico y a la formulación de políticas públicas que fortalezcan la administración tributaria en el contexto de la transformación digital global. (p. 2845)

En consecuencia, conforme a lo mencionado por Calle (2025) se determinó que la facturación electrónica se considera como una herramienta de modernización, la cual permite que actualmente las compañías cumplan con sus obligaciones en el menor tiempo posible, todo esto a través de la disponibilidad de una adecuada infraestructura tecnológica.

Los resultados demuestran que, en concordancia con el modelo TAM, la percepción de utilidad de la integración del sistema contable con el SRI fue el factor determinante para obtener una adecuada adopción, superando las barreras iniciales de la percepción de esfuerzo.

5. Conclusiones

La implementación de la facturación electrónica se ha consolidado como un factor determinante en la modernización operativa y contable del entorno empresarial analizado. A partir del análisis realizado en las empresas Páez, Florencia & Co. Cía. Ltda. y GMA Mosquera Aulestia S.A.S., mediante la conciliación de los registros del sistema informático frente a lo declarado en el Formulario 104 durante el ejercicio fiscal 2025, se evidencia que esta herramienta optimiza significativamente la calidad y la trazabilidad de la información financiera, reduciendo los errores en el reporte tributario. Los hallazgos de campo revelan que el 51.61% de la motivación para la adopción tecnológica fue impulsado por regulaciones externas, confirmando que el cumplimiento normativo es el principal motor de transformación. No obstante, una vez superada la curva de aprendizaje, el 83.87% de los participantes reconocen una mejora sustancial en la calidad y agilidad de sus operaciones cotidianas, respaldada por el fortalecimiento de la infraestructura tecnológica interna.

A pesar del tratamiento de los datos analizados, esta investigación presenta limitaciones inherentes a su diseño metodológico que deben ser consideradas para la correcta interpretación de los resultados. Al configurarse como un estudio de caso múltiple centrado de forma exclusiva en dos empresas con características particulares, los hallazgos obtenidos poseen un alcance cualitativo y analítico, por lo que no pretenden ser estadísticamente generalizables a la totalidad de empresas de la ciudad de Quito. Asimismo, el alto volumen de comprobantes electrónicos procesados ha originado nuevas áreas de riesgo crítico vinculadas a la seguridad de la información y vulnerabilidad de los datos.

Desde una perspectiva institucional y de política pública, las conclusiones de este trabajo ofrecen implicaciones prácticas de alto valor para el SRI. Los resultados demuestran que el impacto positivo de la facturación electrónica en el contribuyente no depende únicamente de la obligatoriedad de la norma, sino del nivel de preparación interna, la gestión del cambio y la inversión sostenida en capacidades tecnológicas por parte de las empresas.

Finalmente, las restricciones y descubrimientos de este artículo abren el camino para futuras líneas de investigación que permitan consolidar el conocimiento en esta área contable. De igual manera, se plantea como una necesidad imperativa explorar el impacto de la facturación electrónica desde la perspectiva de los sistemas de gestión de la seguridad de la información, evaluando cómo las empresas de servicios y auditoría están mitigando los riesgos cibernéticos y de almacenamiento en la nube derivados de la masificación de los comprobantes digitales.

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The authors declare no conflict of interest.

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ETHICS STATEMENT

This study did not involve human participants or animals and therefore did not require ethical approval.

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