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Administrative Sciences

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Suggested Citation: Vallejo-Imbaquingo, Roberto; Robalino-López, Andrés (2025) : The role of Latin American universities in entrepreneurial ecosystems: A multi-level study of academic entrepreneurship in Ecuador, Administrative Sciences, ISSN 2076-3387, MDPI, Basel, Vol. 15, Iss. 3, pp. 1-26,
<https://doi.org/10.3390/admsci15030108>

This Version is available at:

<https://hdl.handle.net/10419/321252>

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Article

The Role of Latin American Universities in Entrepreneurial Ecosystems: A Multi-Level Study of Academic Entrepreneurship in Ecuador

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Abstract: Entrepreneurship plays a crucial role in driving innovation, productivity, and economic growth, with universities emerging as key actors within entrepreneurial ecosystems. This study seeks to expand the understanding on the role of Latin American universities on entrepreneurial ecosystems by examining the case of alumni from Escuela Politécnica Nacional (EPN). Employing a mixed-methods approach, this research explores individual, organizational, and institutional dynamics within the Ecuadorian entrepreneurial ecosystem. Results indicate that universities like EPN nurture professional and technical capabilities but face institutional obstacles that restrict their capacity to foster knowledge-based, high-growth ventures. This study highlights several institutional-level barriers, including market dominance, limited access to formal financing, corruption, and complex regulations, that limit innovation. Thus, universities in the region play an important role in preparing potential entrepreneurs, yet their impact is ultimately restricted by contextual factors. To overcome these challenges, universities can strengthen their support by integrating entrepreneurship education, networking opportunities, early-stage venture experiences, and exposure to role models or success stories. Particularly in contexts like Ecuador, fostering self-efficacy, resilience, and opportunity recognition can boost entrepreneurial behavior. In addition, enhancing university–industry collaboration, encouraging business transparency, improving funding accessibility, and supporting knowledge-intensive businesses are essential steps to harness the full potential of universities in the entrepreneurial ecosystem.

Keywords: academic entrepreneurship; entrepreneurial ecosystem; youth employment; Latin America



Received: 6 November 2024

Revised: 13 January 2025

Accepted: 18 February 2025

Published: 18 March 2025

Citation: Vallejo-Imbaquingo, R., & Robalino-López, A. (2025). The Role of Latin American Universities in Entrepreneurial Ecosystems: A Multi-Level Study of Academic Entrepreneurship in Ecuador. *Administrative Sciences*, 15(3), 108. <https://doi.org/10.3390/admsci15030108>

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1. Introduction

Entrepreneurship has drawn the attention of researchers for its role in innovation, productivity, and economic growth (Baumol & Strom, 2007; Urbano et al., 2019a; Zamora-Boza, 2018). The study of entrepreneurship is a research field that has grown since the 1990s, particularly in English-speaking countries, which have significantly contributed through research published in high-impact journals. However, the participation of regions like Latin America remains limited (Lopez & Alvarez, 2018).

Universities have been identified as one of the most relevant nodes of activity in entrepreneurial ecosystems (Hayter, 2016; Malecki, 2018). In Latin America, universities are the organizations that harbor the largest number of researchers and generate more scientific papers than public and private organizations, so they represent a privileged space to learn first-hand about recent discoveries, interact with researchers and transform them into

innovations (Guerrero et al., 2020; OCTS, 2018). Universities can promote entrepreneurship through mechanisms such as entrepreneurship education, business incubators, funding, spin-offs, networking, etc. (Hayter, 2016; Siegel & Wright, 2015). Moreover, some forms in which they may affect entrepreneurial ecosystems are the creation of startups that generate new jobs, technology transfer, and knowledge spillovers (Audretsch, 2014; B. B. Fischer et al., 2018; Guerrero et al., 2016; Spiegel, 2017).

Adopting a systemic perspective, the entrepreneurial ecosystem literature shifts the focus of entrepreneurship studies towards an innovation system framework, which examines how networks of actors contribute to the creation, dissemination, and application of innovations, as well as how institutions shape the patterns of these interactions (Alvedalen & Boschma, 2017; Midgley & Lindhult, 2021).

This work aims to fill the gap on the comprehension of how Latin American universities affect entrepreneurial ecosystems; therefore, a case of Escuela Politécnica Nacional's alumni is studied. This study proposes the research questions: What is the role of the university in the Latin American entrepreneurship ecosystem? And what are the limitations and opportunities that academic alumni's businesses encounter in this ecosystem?

This research introduces an exploratory–explanatory approach to characterize and describe the interactions involved in the dynamics of university entrepreneurship ecosystem by analyzing a case of an Ecuadorian university.

This paper starts by reviewing the relevant literature on academic entrepreneurial ecosystems and proposing working hypotheses for the development of a causal model. The next section describes the methods applied in this research. In the following section, results and discussion are detailed. In the final section, this paper delivers the conclusions, study implications, and limitations.

2. Literature Review, Hypotheses, and Conceptual Framework

2.1. Entrepreneurial Ecosystems

The entrepreneurial ecosystem approach represents a shift from traditional perspectives toward a focus on people, networks, and institutions. Entrepreneurial ecosystems can take on various configurations, encompassing multiple overlapping attributes and institutions that foster entrepreneurial activity (Spiegel, 2017; Stam, 2015). Nevertheless, there is no consensus regarding how the constituent elements are interconnected and which institutions influence the structure and performance of entrepreneurial ecosystems (Alvedalen & Boschma, 2017).

The perspective of entrepreneurial ecosystems provides a framework for integrating academic knowledge about specific regional characteristics, as it incorporates information about the entrepreneur, their context, and the stakeholders involved (Stam, 2015).

2.2. Institutions, Individuals, and Organizations

The study of institutional entrepreneurship comprises two complementary perspectives: institutional theory, which focuses on informal institutions and entrepreneurial strategies, and institutional economics, which examines the drivers and consequences of entrepreneurial actions and the formal institutions that shape them, such as government policies (Pacheco et al., 2010). These approaches emphasize the need to view entrepreneurs as agents of change who operate within complex systems of formal and informal rules, social contexts, and market conditions. Research in this field spans multiple levels, exploring how higher-level events or conditions influence entrepreneurial actions and institutional evolution at lower levels (Scott, 2014).

A key distinction in this framework lies between institutions, considered the “rules of the game”, and organizations, the “players” operating within these rules (North, 2010). In-

stitutions impose constraints on individuals through social norms and beliefs, shaping economic opportunities and influencing the emergence of organizations (Pacheco et al., 2010).

Within the institutional approach, it is considered that the social or economic structure does not entirely determine the individual behavior of the entrepreneur, nor can the entrepreneur act without constraints (Scott, 2014). In addition, Malecki (2018) highlights that a functional business ecosystem emerges from a supportive coevolution of individual activities of entrepreneurs, organizations, and institutions.

Bjørnskov and Foss (2016) emphasize the importance of studying the links between institutions, entrepreneurship, and their outcomes; these links can be represented through the concept of “Coleman’s bathtub”, which indicates that no causal mechanism fully develops at a macro-level (institutions and policies) because there are interactions mediated at a micro-level (entrepreneurial conditions).

2.3. Academic Entrepreneurial Ecosystems

University or academic entrepreneurial ecosystems are characterized by networks formed by a university and comprise the relationships among actors that involve in commercial or entrepreneurial activities (Kobylińska & Lavios, 2020; Prokop, 2021); they respond to mission of superior educational institutions to prepare professionals for seizing alternative employment opportunities, such as starting their own business (Guerrero et al., 2020).

Based on a bibliometric review of academic entrepreneurship ecosystems and Bjørnskov and Foss (2016) “Coleman’s bathtub” conceptual framework, a theoretical model of the relationships in the academic entrepreneurship ecosystem is proposed, identifying three levels of interaction: individual level—micro; organizational level—meso; and institutional level—macro (Figure 1).

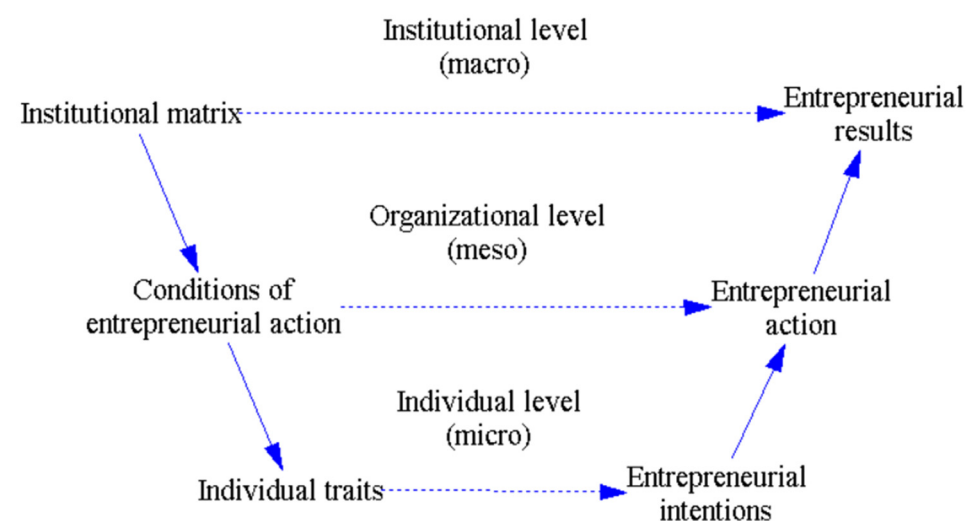


Figure 1. Links between institutional matrix, organizations, entrepreneurship, and its results.

2.4. Individual Level (Micro)

From an individual view, an entrepreneur’s contributions to the economy largely depend on their ability to identify opportunities and seize them (Baumol & Strom, 2007; Nissan et al., 2011). Their ability to make sound decisions allows them to impact the market and foster economic growth. Specifically, academic entrepreneurs are individuals who engage in the integration of resources, knowledge, new technologies, and value creation, establishing a connection between academia and the business world (Guerrero et al., 2016; Horowitz Gassol, 2007; Xia et al., 2018). Regarding the university environment, Guerrero et al. (2020) highlight the importance of educational programs in developing specific skills and abilities, such as identifying business opportunities and managing uncertainties, which

are crucial to succeed as an academic entrepreneur. Furthermore, the training of human capital is a substantial factor in the spreading of knowledge beyond the university; in addition, favorable social climates can be developed to foster a culture of entrepreneurship via educational programs and the generation of links between the academy and business stakeholders (Guerrero et al., 2016; Nissan et al., 2011; Spigel, 2017).

2.5. Organizational Level (Meso)

On a mid-level, organizations represent structures in which human interactions occur and their mere existence reveal opportunities provided by an institutional matrix (Veciana & Urbano, 2008). Universities are relevant for economic growth since they directly or indirectly influence the economy through the formation of professionals, the development of start-ups derived from the university, the registration of patents and licenses, consulting services, and other mechanisms of technology transfer (Alvarado-Moreno, 2018; Fuster et al., 2019; Guerrero et al., 2016, 2020; Malecki, 2018; Nissan et al., 2011; Pérez-Hernández et al., 2021). A favorable entrepreneurial university environment, combined with students' desire for starting a business and income goals, plays a key role in influencing graduates' engagement in academic entrepreneurship (Guerrero et al., 2020). Consequently, if the context is conducive, scientific and technological advances can reach the market and have an impact on economic growth; therefore, organizations become relevant actors for entrepreneurial ecosystems (Guerrero et al., 2016, 2020; Spigel, 2017).

2.6. Institutional Level (Macro)

From a macro-perspective, economic growth can be promoted by fostering an institutional context that supports entrepreneurial activity (Ács et al., 2014; Audretsch, 2014). Institutions play a key role in entrepreneurial networks by shaping interactions between individuals, businesses, and organizations (North, 2010). These institutions are dynamic and operate across various dimensions, including norms and values, established practices, and regulatory frameworks, which influence entrepreneurial processes differently in each region (Ács et al., 2014; Alvedalen & Boschma, 2017; Urbano et al., 2019a). As a result, variations in institutional support can lead to distinct rates of entrepreneurship, types of ventures, and regional development paths (Acs et al., 2017; Spigel, 2017; Urbano et al., 2019a). For instance, some factors that promote students' entrepreneurial intentions are government programs and support, education and training, and cultural factors (Elnadi & Gheith, 2021).

Theoretical relationships in the academic entrepreneurial ecosystem are described in the working hypotheses:

H1. *The State influences the regulations and laws that make up the institutional matrix; these influence the training of the entrepreneur and exploitable opportunities to start a business (Aparicio et al., 2016; Elnadi & Gheith, 2021; North, 2010; Thornton et al., 2011; Veciana & Urbano, 2008).*

H2. *The approach to successful business stories and role models encourages risk-taking attitudes and influences potential entrepreneurs to start their businesses (Aparicio et al., 2021b; Elnadi & Gheith, 2021; Spigel, 2017).*

H3. *Previous entrepreneurial experiences influence attitudes, perceptions, and intentions to start a business (Castro & Zermeño, 2020; Guerrero et al., 2020; Soria-Barreto et al., 2017).*

H4. *Potential entrepreneurs analyze the opportunity cost of starting a business or accessing a job that provides a high salary and more excellent financial stability, so an institutional matrix that does not give the confidence of adequate compensation can reduce entrepreneurial activ-*

ity (Autio et al., 2014; Elnadi & Gheith, 2021; Mack & Mayer, 2016; McMullen et al., 2008; Shane & Venkataraman, 2000).

H5. The university promotes entrepreneurial skills by training the professional profile of students. In this way, universities encourage the creation of new businesses (Elnadi & Gheith, 2021; B. Fischer et al., 2020; Rodriguez-Gutierrez et al., 2020; Saeed et al., 2015).

H6. People considering having the necessary skills to open a business find greater motivation to carry out entrepreneurial actions (Ács et al., 2014; Guerrero et al., 2020; Oganisjana & Matlay, 2012).

H7. The decisions taken by entrepreneurs, in their role as disseminators of knowledge, are essential for the performance of entrepreneurial activity, innovation, and economic growth (Baumol & Strom, 2007; Guerrero et al., 2020).

H8. University-derived ventures play a relevant role in bringing university knowledge and innovation to the market, fostering productivity and economic growth (Baumol & Strom, 2007; B. B. Fischer et al., 2018; Fuster et al., 2019).

H9. Economic growth benefits the State that, in its interest to maximize profits, designs and apply regulations to promote productive activity (Cohen, 2006; Elnadi & Gheith, 2021; North, 2010).

H10. Institutions affect the State. At the same time, it influences the institutional matrix through the legitimization of organizations, the regulations, and the application of the laws that govern them and, consequently, affect individuals (Ingram & Silverman, 2002; North, 2010; Spiegel, 2017; Stam, 2015).

H11. The rule of law and transparency increase the venture's viability to generate economic impact (Jiménez & Alon, 2018; North, 2010).

H12. Competition encourages companies to invest in the development of skills and knowledge to innovate and improve their efficiency, taking advantage of the opportunities that arise in the market (Ingram & Silverman, 2002; Spiegel, 2017).

H13. Collaborations with universities, public research institutes or established companies and other accessible sources of knowledge such as conferences, patents, and scientific publications, among others, foster the dissemination of knowledge and, as well as investment in R&D, promote the development of new products (Belitski et al., 2021; Brem & Radziwon, 2017; B. B. Fischer et al., 2018; Guerrero & Urbano, 2017).

3. Methodology

An exploratory–explanatory study was developed to comprehend the contribution of the university to the economy mediated by alumni's economic and entrepreneurial activities from Escuela Politécnica Nacional (EPN), an Ecuadorian university, as a case of study. Thus, this research consisted of four phases (Figure 2):

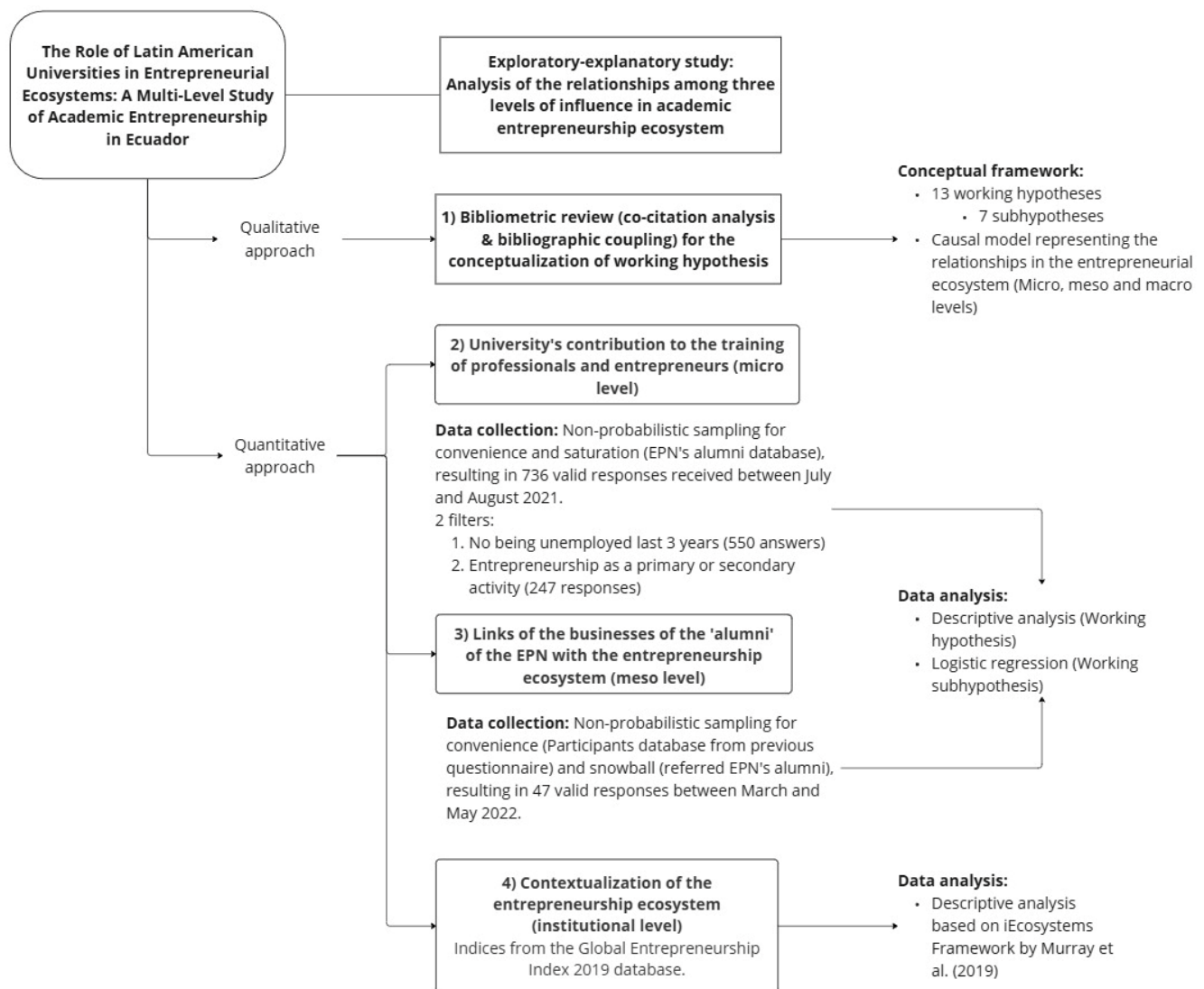


Figure 2. Methodology smart chart. References: [Acs et al. \(2019\)](#) and [Murray et al. \(2019\)](#).

3.1. Qualitative Approach

Bibliometric Review and Conceptualization of Working Hypotheses

The qualitative approach consisted of a bibliometric review of the academic entrepreneurship ecosystems literature. A combination of co-citation analysis and bibliographic coupling was performed; these techniques are considered complementary, as they provide a view on the fundamental references and the current themes on a research field ([Donthu et al., 2021](#); [Kovács et al., 2015](#)).

To carry out the search, the word string applied in Scopus was as follows: "TITLE-ABS-KEY("entrepreneurial ecosystem*" OR "startup ecosystem*" OR "innovation ecosystem*") AND TITLE-ABS-KEY("university" OR "higher education institution*" OR "academic entrepreneurship")".

Co-citation mapping represents the references cited in common in the literature allowing the identification of the theoretical foundations in a field of research, while bibliometric coupling visualizes the relationship of documents according to the references they have cited in common with other publications, so it provides a more current view of the research field ([Donthu et al., 2021](#); [Kovács et al., 2015](#); [Meyer-Brötz et al., 2018](#)). Therefore, this research reviewed the most relevant references found in the co-citation analysis and bibliometric analysis to develop the conceptual framework and unveil the components

and links studied in academic entrepreneurial ecosystems for conceptualizing the working hypothesis that constitutes the causal model proposed. A working hypothesis is a statement of expectation that is tested in action, and, as it is provisional, it is subject to change, and it can be supported by evidence that may or may not be statistical (Casula et al., 2021). The working hypotheses that comprise the conceptual framework of the academic entrepreneurship ecosystem were modeled using an influence diagram, where the relationships of the main constructs are displayed (Figure 3).

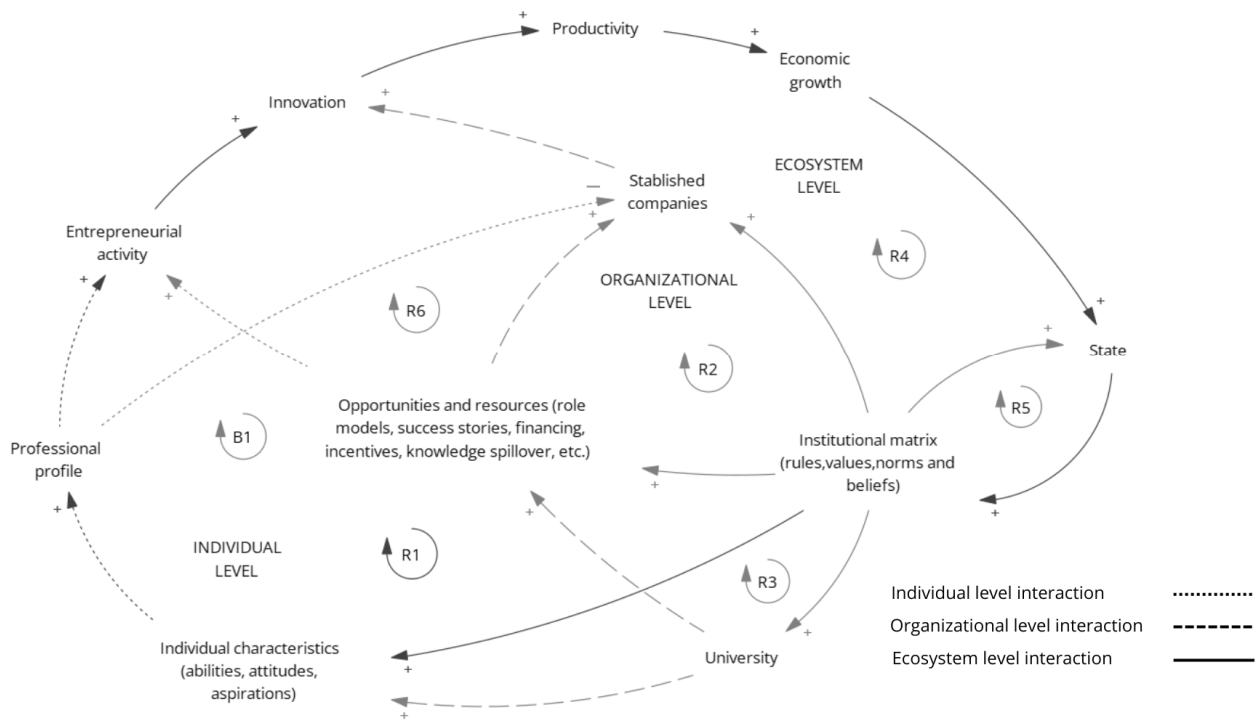


Figure 3. Causal model of relationships in the entrepreneurship and innovation ecosystem.

Feedback (R) and balance (B) loops from the causal model are shown in Figure 2 and detailed in Table 1.

Table 1. Feedback (R) and balance (B) loops in the model.

Loop	Relation with Working Hypotheses
R1	H1, H3, H6, H7, H9, H10
R2	H1, H2, H6, H7, H9, H10
R3	H1, H3, H5, H6, H7, H8, H9, H10
R4	H9, H10, H13
R5	H10, H11
R6	H10, H12, H9
B1	H1, H3, H4, H12, H9

3.2. Quantitative Approach

Variables included in the questionnaire, categories, and their relationship with the working hypotheses are shown in Figure 4.

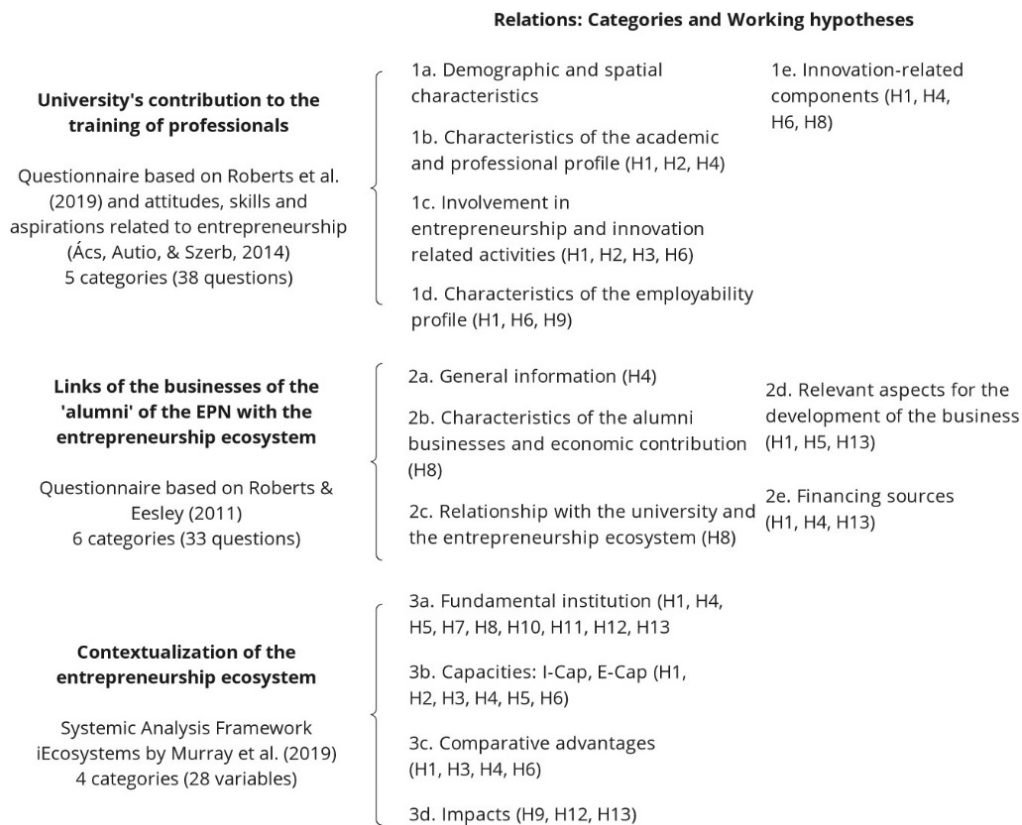


Figure 4. Data collection categories and relationships with working hypotheses. References: Roberts et al. (2019), Ács et al. (2014), Roberts and Eesley (2011), and Murray et al. (2019).

3.2.1. University's Contribution to the Training of Professionals and Entrepreneurs

Based on the conceptual model, data were collected through the application of a questionnaire based on Roberts et al. (2019), and variables related to attitudes, skills, and aspirations based on Ács et al. (2014) were included. The questionnaire was sent to EPN's alumni database, applying a non-probabilistic convenience sampling, and obtaining 736 valid responses. Total respondents were 67% male and 33% female, an average age of 33.5 years old (std. dev. 8.5 y.o.).

The first filter was applied after the 1b category to respondents who were unemployed during the 3 years before the study, as the research did not contemplate this category of participants. In total, 550 participants continued the questionnaire, and those who owned a business as a primary or secondary economic activity were selected to complete the 1e category to deepen the innovation components (247 participants).

3.2.2. Links of the Businesses of the 'Alumni' of the EPN with the Entrepreneurship Ecosystem

To identify the business' links of the EPN alumni with the entrepreneurship ecosystem, characterize their ventures, and identify the potential influence of the university, more specific information was obtained through the application of a questionnaire based on Roberts and Eesley (2011). This questionnaire applied a non-probabilistic for convenience sampling and by "snowball", resulting in 47 valid responses. The average year of businesses initiation was 2015, and 79% of the participants had their head office in Quito city.

3.2.3. Contextualization of the Entrepreneurship Ecosystem

iEcosystems methodology based on Murray et al. (2019) was applied to characterize the Ecuadorian institutional context, evaluating four main elements: fundamental institu-

tions, capacities: entrepreneurship (e-Cap) and innovation (i-Cap), comparative advantages, and impacts. The Global Entrepreneurship Index 2019 data were obtained for analysis.

3.2.4. Operationalization of Working Hypothesis

The theoretical model consisted of 13 working hypotheses. Following [Casula et al. \(2021\)](#), working hypotheses were operationalized into working sub-hypotheses to seek quantitative evidence in the available data. Dichotomous variables used binary coding (Yes = 1, No = 0), while ordinal dependent variables (i.e., degree of innovation in product or service, and sales level) were grouped and coded into binary variables (High = 1, Low = 0) for a logistic regression analysis ([Menard, 2002](#)). Logistic regression (Method: Enter) was performed using IBM® SPSS® Statistics version 19 software.

Hypotheses were operationalized as seen on Table 2.

Table 2. Operationalization of hypotheses.

Working Hypotheses	Evaluation Method	Variables	Categories and Levels of Analysis
H1	Descriptive analysis	Business risk, market dominance, globalization, depth of capital market	Fundamental institutions (macro), Capacities (i-Cap) (macro)
H2	Descriptive analysis	Know entrepreneurs, risk perception, technology level	Capacities (e-Cap, i-Cap) (macro)
H2a *	Logistic regression	Fear of failure (ACT_FRAC—Dep.), Met entrepreneurs in recent years (ACT_INI—Ind.)	Involvement in entrepreneurship-related activities (micro)
H2b *	Logistic regression	Currently running a business (AEC_EMPR2—Dep.), Met entrepreneurs in recent years (ACT_INI—Ind.)	Characteristics of employability profile, Involvement in entrepreneurship-related activities (micro)
H3	Descriptive analysis	Career status, opportunity motivation	Capacities (e-Cap, i-Cap) (macro)
H3a *	Logistic regression	Career status (ACT_BA—dep.), entrepreneurial experience (RE_INI—Ind.)	Involvement in entrepreneurship-related activities (micro)
H3b *	Logistic regression	Entrepreneurial intentions (ACT_BA—dep.), entrepreneurial experience (RE_INI—Ind.)	Involvement in entrepreneurship-related activities (micro)
H4	Descriptive analysis	Market agglomeration, market dominance, informal investments	Fundamental institutions (macro), Capacities (i-Cap) (macro)
H5	Descriptive analysis	Tertiary education, educational level	Fundamental institutions (macro), Capacities (e-Cap) (macro)
H6	Descriptive analysis	Perceived capabilities	Capacities (e-Cap) (macro)
H6a *	Logistic regression	Currently running a business (AEC_EMPR2—Dep.), Knowledge and skills perception (ACT_HAB—Ind.)	Characteristics of employability profile (micro), Involvement in entrepreneurship-related activities (micro)
H7	Descriptive analysis	Business strategy, staff training	Fundamental institutions (macro)
H8	Descriptive analysis	Technology transfer	Fundamental institutions (macro)

Table 2. Cont.

Working Hypotheses	Evaluation Method	Variables	Categories and Levels of Analysis
H8a *	Logistic regression	Degree of innovation in product or service (EMPRE_INNO2—Dep.), Origin of the main business idea linked to EPN (IDEAP_EPN2—Ind.)	Innovation-related components (micro) Relationship with the university and entrepreneurship ecosystem (meso)
H8b *	Logistic regression	Sales level (EMPR_VENTAS2—Dep.), Origin of the main business idea linked to EPN (IDEAP_EPN2—Ind.)	Characteristics of the alumni businesses and economic contribution (meso), Relationship with the university and the entrepreneurship ecosystem (meso)
H9	Descriptive analysis	Gazelle	Impacts (macro)
H10	Descriptive analysis	Economic freedom	Fundamental institutions (macro)
H11	Descriptive analysis	Corruption	Fundamental institutions (macro)
H12	Descriptive analysis	New tech, tech absorption, staff training, Competitors	Fundamental institutions (macro), impacts (macro)
H13	Descriptive analysis	Technology transfer, export, new product, new tech	Fundamental institutions (macro), impacts (macro)

* According to [Casula et al. \(2021\)](#), working hypotheses are operationalized into sub-hypotheses to find quantitative evidence in the collected data. Dependent variable: Dep. Independent variable: Ind.

4. Results and Discussion

4.1. Bibliometric Review

The Scopus search resulted in 1033 documents (from 2006 to 2024), and the most relevant references were mapped as seen in Figure 5 (co-citation network visualization) and Figure 6 (bibliographic coupling).

The 1033 documents obtained from the database search contained 48,126 references; however, a filter of 20 minimum citations was applied to perform the co-citation network visualization, obtaining 33 items visualized and selected for review on the fundamental theory in the study field. After a review of the documents' abstracts, cluster themes were identified as follows:

- (1). Entrepreneurial universities and innovation ecosystems: Articles in this cluster highlight the university's relevance to entrepreneurial and innovation ecosystems based on its potential to promote entrepreneurship education and the support to the creation of knowledge-based startups.
- (2). Entrepreneurial ecosystems and regional innovation: This cluster features the importance of understanding the dynamic nature of these ecosystems, the roles of various stakeholders, and the interactions between cultural, social, and material factors.
- (3). Business strategy and innovation ecosystems: These articles explore the concept of business and innovation ecosystems from a strategic view, analyzing the interdependencies between firms and other actors, including suppliers, customers, and policymakers.
- (4). Sustaining entrepreneurial ecosystems: Articles in this cluster emphasize the importance of creating favorable conditions for entrepreneurship while remarking the importance of a strategic, holistic approach to fostering growth and sustainability.

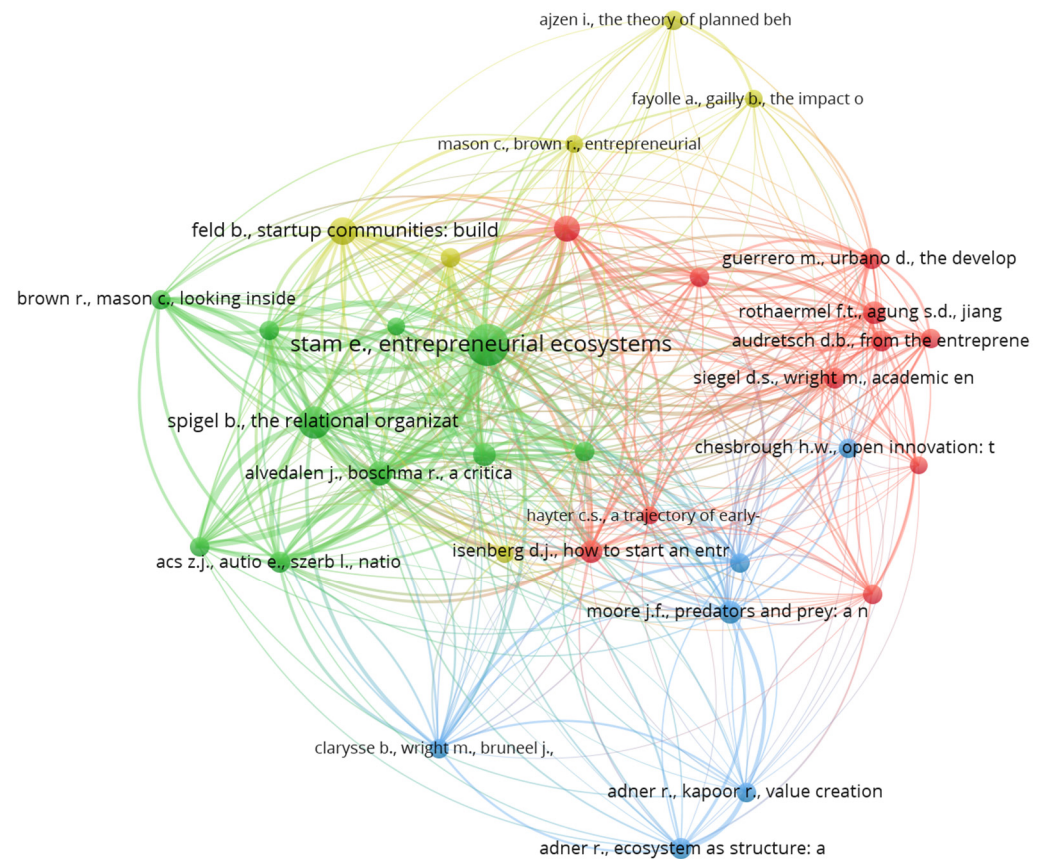


Figure 5. Co-citation network visualization: Cluster 1 (Red): Entrepreneurial universities and innovation ecosystems. References: [Audretsch \(2014\)](#); [Autio et al. \(2014\)](#); [Etzkowitz \(2008\)](#); [Etzkowitz et al. \(2000\)](#); [Etzkowitz and Leydesdorff \(2000\)](#); [Guerrero et al. \(2016\)](#); [Guerrero and Urbano \(2012\)](#); [Hayter \(2016\)](#); [Rothaermel et al. \(2007\)](#); [Siegel and Wright \(2015\)](#). Cluster 2 (Green): Entrepreneurial ecosystems and regional innovation. References: [Ács et al. \(2014\)](#); [Acs et al. \(2017\)](#); [Alvedalen and Boschma \(2017\)](#); [Brown and Mason \(2017\)](#); [Cohen \(2006\)](#); [Mack and Mayer \(2016\)](#); [Miller and Acs \(2017\)](#); [Spigel \(2017\)](#); [Spigel and Harrison \(2018\)](#); [Stam \(2015\)](#). Cluster 3 (Blue): Business strategy and innovation ecosystems. References: [Adner \(2017\)](#); [Adner and Kapoor \(2010\)](#); [Chesbrough and Teece \(2002\)](#); [Clarysse et al. \(2014\)](#); [Eisenhardt \(1989\)](#); [Moore \(1993\)](#). Cluster 4 (Yellow): Sustaining Entrepreneurial Ecosystems. References: [Ajzen \(1991\)](#); [Fayolle and Gailly \(2015\)](#); [Feld \(2015\)](#); [Isenberg \(2011\)](#); [Mason and Brown \(2014\)](#); [Shane and Venkataraman \(2000\)](#).

For bibliographic coupling, a filter of a minimum of 50 citations was applied to obtain 74 items that constituted the network visualization and represent the current themes of research in this field of study. Four clusters were identified and selected for a review of their abstracts; they were identified as follows:

- (1). Universities and innovation ecosystems: Key themes in this cluster include the integration of universities into broader innovation ecosystems, the evolving role of academic entrepreneurs, and the management of these ecosystems to foster successful knowledge exchange and commercialization.
- (2). University influences entrepreneurial activity: The cluster stresses the importance of institutional and social factors, such as cultural attitudes and government support, in shaping entrepreneurial outcomes.
- (3). Innovation ecosystems and stakeholders' integration: This cluster focuses on how various stakeholders, including universities, industry, and government, collaborate to drive innovation and entrepreneurship.

- (4). Innovation ecosystems dynamics and governance: Documents in this cluster explore how universities contribute to knowledge transfer, co-creation, and the governance of innovation ecosystems.

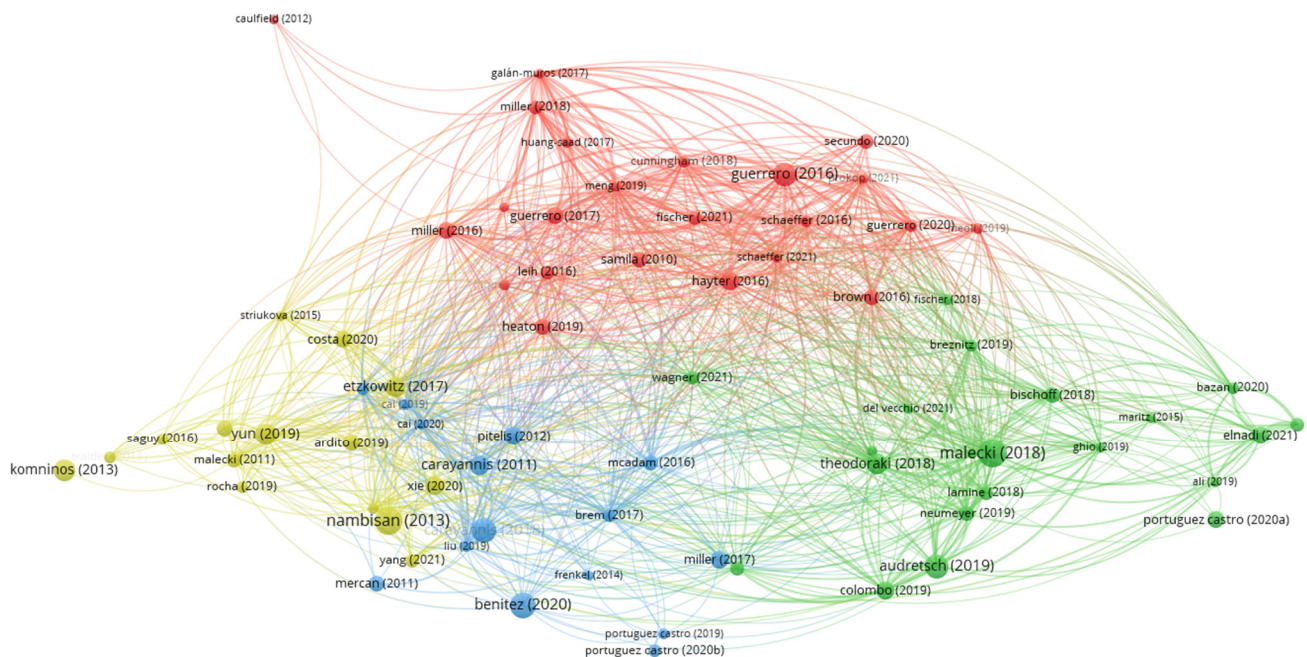


Figure 6. Bibliographic coupling network visualization: Cluster 1 (Red): Universities and Innovation Ecosystems, Cluster 2 (Green): University influences on entrepreneurial activity, Cluster 3 (Blue): Innovation ecosystems and stakeholders' integration, Cluster 4 (Yellow): Innovation ecosystems dynamics and governance.

According to bibliometric review, universities are key actors in entrepreneurial ecosystems, as they possess the capacity of fostering innovation by generating and disseminating knowledge that seeds new ventures and enrich industries (Guerrero et al., 2020; OCTS, 2018) while also cultivating entrepreneurial mindsets through business education, incubators, and practical training programs (Hayter, 2016; Siegel & Wright, 2015). One of the topics that has interested researchers is the study of entrepreneurial intentions as the main predictor of business start; nevertheless, the results about the effectiveness of university mechanisms and moderators diverge (Bae et al., 2014; Liñán & Fayolle, 2015; Martin et al., 2013). However, the literature still highlights the critical role of universities in developing new talents and enabling network building among students, researchers, investors, and industry professionals (Audretsch, 2014; Spigel, 2017). Moreover, universities drive technology transfer and commercialization by translating research results into marketable products and services through spin-offs, licensing agreements, and strategic partnerships (Alvarado-Moreno, 2018; Guerrero et al., 2020; Malecki, 2018).

4.2. University's Contribution to the Formation of Professionals and Entrepreneurs (Individual—Micro-Level)

Individual level of analysis of EPN's alumni exhibited the characteristics of participants' economic activities: 61.5% with adequate employment (their income covers their basic needs and those of their family, and they work at least 40 h), 17% unemployed (not currently working), 7.9% entrepreneurs motivated by opportunity (own a venture whose objective is to accumulate profits and generate employment), 6% entrepreneurs driven by necessity (run a business that looks to cover personal and family expenses as an alternative to lack of job opportunities), 5.6% underemployment (his income is less than USD 400, and

he works less than 40 h weekly) and, finally, 2% with inadequate unpaid employment (has no income, does unpaid work at home or in other spaces). The national unemployment rate for August 2021 was 4.9% (INEC, 2021), so the percentage of unemployment in the participants during the study was nearly three times higher (17%). However, among the participants, the majority were adequately employed (61.5%); this percentage was nearly double the national rate (32.4%) (INEC, 2021).

Following, 74.7% of participants were selected to continue the survey as they were employed during the past three years (including self-employment), while the remaining percentage (25.3%) were unemployed during that period. Henceforth, the 74.7% (550 participants) that continued with the questionnaire were considered the new total. A total of 47% of this group of alumni considered that they have participated in developing innovative products or services (which have a significant competitive advantage or with high-growth potential). Additionally, 50% have worked on developing products or new businesses in a company in which they were not a founder. The involvement in these activities is related to the ability to use new knowledge and convert it into innovative products or services, which requires skills that are not common in the entire population (Acs et al., 2009). In addition, in this group of participants, favorable perceptions and attitudes toward entrepreneurship were found, as seen in Figure 7.

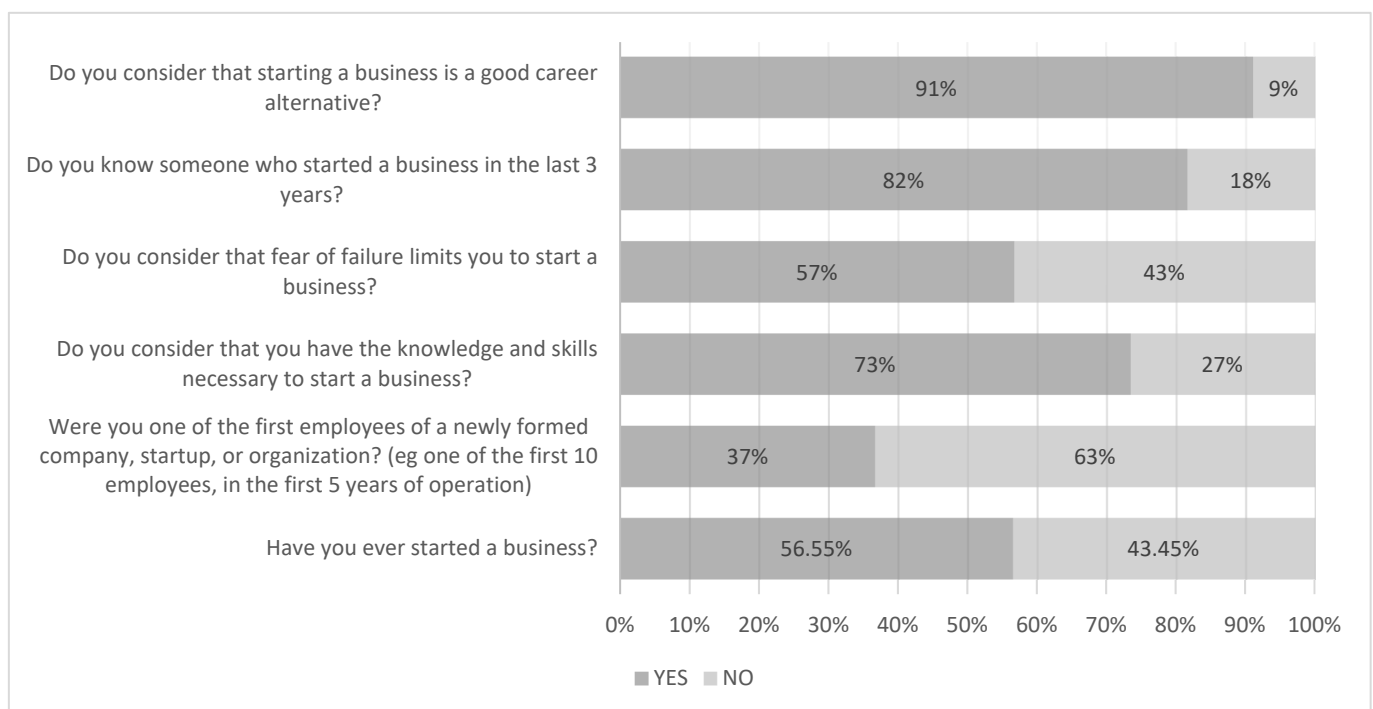


Figure 7. Perceptions and attitudes related to entrepreneurship. Source: Own work.

The perception of entrepreneurship as a good career alternative, and the perception of having the knowledge and skills to start a business (self-efficacy) provide a vision of the feasibility and desire to be self-employed (Ács et al., 2014). On the other hand, 57% of alumni considered fear of failure a limitation to starting a business. Previous research indicates that fear of failure deters potential entrepreneurs from carrying on actual entrepreneurial actions (Kong et al., 2020). It has been evidenced that exposure to role models reduces fear of failure, which is opposed to what is seen in this study, where even though 82% of alumni have known entrepreneurs in recent years, fear of failure still shows being important in participants. Wyrwich et al. (2016) explains diminished effects of role models on fear of failure by arguing that the institutional environment moderates this

relation. As data for this study were collected in 2021 while the COVID-19 pandemic emergency was still active, uncertainty from this context might enhance fear of failure among participants.

4.3. Links of the Businesses of the 'Alumni' of the EPN with the Entrepreneurship Ecosystem (Organizational—Meso-Level)

The analysis of the organizational level identified the motivation to start participants' ventures: 68% as entrepreneurship driven by opportunity and 32% entrepreneurship driven by necessity. Then, participants were asked to estimate the annual sales volumes of their businesses as an average for the last three years. The majority (79%) were less than or equal to 100,000 USD and defined as microenterprises. The rest of the businesses (21%) had incomes between "100,001 to 1,000,000 USD", so they classified as small companies. Also, most alumni businesses (76.6%) concentrated their sales entirely in the local market, while 12.8% of participant ventures had a share of international sales between 1% and 19%, and only two cases had more than 60% international sales participation. Expenses in R&D are related to innovation capacity; the most significant group (34%) of participants' businesses invested between 1% and 5% of their sales. This study finds that 38% of the participating businesses that invest the most in R&D belong to the manufacturing sector, followed by companies related to Agriculture, Construction, Information and Communication, Services, Professional, Scientific and Technical Activities, and Commerce sectors.

Regarding the university influence in business formation, 48% of the responses indicated that other alumni were relevant for establishing their company, mainly in the role of founder. The mechanisms to connect with other founders related to EPN were the following: "In classes" (13%), "Socially" (8%), and "'Networking' within the university" (8%). For 60% of the participants, this question "Does not apply." The primary connection mechanisms with founders not associated with the EPN identified were the following: "In the workplace" (13%), "Socially" (12%), and "By family references" (10%), finally, for 48% of cases did not apply this question. For the origin of the business idea, EPN's main influences were "In classes" as the primary source (15%), "thesis" (7%), and "working for a company contacted by the university" (7%); however, in 48% of cases, it did not apply. On the other hand, other most relevant sources were "Working for a private company" (40%), followed by "Conversation with a professional contact" (11%).

This reveals a modest university's influence on alumni businesses, the most important contribution being meeting fellow students that became founders without influencing meaningfully on their business ideas. Also, R&D investments by alumni businesses were relatively low, showing a small impact on the market with most ventures being microenterprises targeting local markets. This indicates limited translation of university-based knowledge into high-growth entrepreneurial outcomes. The latter can be supported by observing that intellectual property was not a critical factor for 85% of the participants.

In relation to the capital that participants required to start their company, 32% indicated from "1001 to 5000 USD"; 30% from "0 to 1000 USD"; 19% from "5001 to 2000 USD"; finally, the remaining 19% required more than 20,000 USD. Also, alumni estimated the range of participation of various sources in the financing to start their business. The largest funding source identified was the "Personal savings of the founders" (Average: 61%), which in most cases constituted the total financing. Less participation had "Loan or credit card from the founders" (Average: 16%), followed by "Family and friends of the founders" (Average: 12%). As alumni ventures relied heavily on personal savings and family support, it demonstrates a lack of formal funding avenues. This agrees with the literature, which has shown that in contexts where a low availability of capital is present, such as Ecuador, informal sources such as family and friends are relevant (Lasio et al., 2020). Funding is a key aspect for the development of start-ups, especially knowledge-based undertakings,

while, in some cases, universities may provide sources of funding (e.g., seed capital), or they may obtain external private or public funding for academic entrepreneurship (Rothaermel et al., 2007).

Beyond the influence of university mechanisms for fostering entrepreneurial behaviors, researchers have called attention upon contextual factors that play an important role moderating individual traits and business action (Shirokova et al., 2016; Siegel & Wright, 2015). Therefore, even when universities develop programs to promote entrepreneurship within the academic community, an unfavorable institutional context may deter entrepreneurial actions. In those cases, universities may put greater emphasis on developing self-efficacy and resilience through mentorship and contact with successful business stories and role models, to prepare potential entrepreneurs for overcoming contextual difficulties (Bullough & Renko, 2013).

4.4. Contextualization of the Entrepreneurship Ecosystem (Institutional—Macro Level)

Indicators obtained from iEcosystems methodology are shown in Table 3 in comparison between three Latin American countries (Colombia, Chile, and Mexico). Chile, a high-income country, was included in the comparative analysis, as it leads the ranking of the Global Competitiveness Index 2019 (integrated as one of the main data sources of GEI 2019) of Latin American and Caribbean countries. Global Entrepreneurship Monitor 2019/2020 (another data source of GEI 2019) reports that Ecuador, Mexico, and Colombia are in the group of middle-income economies in Latin America and the Caribbean, making these countries suitable for comparison.

Evidence suggests that Ecuador presents a weak support for entrepreneurship and innovation. Most notable weaknesses observed were market agglomeration, low globalization index, market dominance, high corruption, low capital sources, high risk of business, low business strategy, low staff training, and low economic freedom. An entrepreneurial limiting context, such as Ecuadorian, does not facilitate convenient conditions for innovation, given the high risk that it entails to undertake. Given a high level of corruption and an inefficient judicial system, market opportunities might be easily exploited by groups with greater influence rather than by innovative companies, which heightens business risk (Fuentelsaz et al., 2018).

The educational level of business owners or managers (E-Cap) was found to be a weakness. EPN alumni, with at least a third-level education, might possess greater capabilities and propensity to undertake. The skills-perception variable stood among E-Caps. Looking at the individual level, a high perception of self-efficacy is also observed. The perception of having knowledge and skills to start a business is one of the most relevant aspects that determine entrepreneurial actions (Ács et al., 2014). Furthermore, a high rate of perception of opportunities was found. On innovation capabilities (I-Cap), a low technological level was found; this indicates a low participation of companies in medium- and high-technology sectors. A healthy entrepreneurial ecosystem fosters innovation; even though this is not the case in the Ecuadorian context, the implementation of institutional policies should promote the introduction of new technologies, as they usually face a lower level of competition in the market and have a high-growth potential (Fuentelsaz et al., 2018). A combination of the ability to identify opportunities and the strengthening of entrepreneurial strategies might have a positive impact in the entrepreneurial ecosystem (Mayhew et al., 2012).

Table 3. Results of iEcosystems variable comparative analysis among Latin American countries.

Hypothesis	Variable	Country			
		Ecuador	Colombia	Chile	Mexico
H1	Risk of business	0.09 (d)	0.3 (c)	1 (b)	0.44 (c)
	Market dominance	0.33 (d)	0.41 (d)	0.41 (d)	0.41 (c)
	Globalization	0.25 (d)	0.48 (c)	0.48 (c)	0.77 (b)
	Depth of capital market	0.4 (c)	0.68 (b)	0.81 (b)	0.61 (c)
H2	Knowledge of entrepreneurs	0.6 (b)	0.43 (d)	0.72 (b)	0.75 (b)
	Risk perception	0.64 (b)	0.62 (b)	0.74 (b)	0.72 (b)
	Technology level	0.32 (d)	0.63 (b)	0.6 (c)	0.4 (d)
H3	Career status	0.55 (c)	0.65 (b)	0.59 (c)	0.31 (d)
	Motivation by opportunity	0.55 (c)	0.48 (d)	0.66 (b)	0.74 (a)
H4	Market agglomeration	0.17 (d)	0.58 (a)	0.79 (b)	0.53 (c)
	Market dominance	0.33 (d)	0.41 (d)	0.41 (d)	0.41 (c)
	Informal investments	0.44 (c)	0.44 (c)	0.73 (a)	0.29 (d)
H5	Tertiary education	0.48 (d)	0.51 (c)	0.74 (b)	0.33 (d)
	Educational level	0.44 (d)	0.44 (c)	0.74 (b)	0.22 (d)
H6	Skills perception	0.93 (a)	0.73 (b)	0.83 (a)	0.6 (b)
H7	Business strategy	0.4 (d)	0.49 (c)	0.59 (b)	0.51 (c)
	Staff training	0.44 (d)	0.67 (b)	0.62 (b)	0.53 (c)
H8	Technological transfer	0.45 (c)	0.47 (c)	0.52 (c)	0.5 (c)
H9	Gazelle (High-growth firms)	0.3 (d)	1 (a)	0.94 (a)	0.32 (d)
H10	Economic freedom	0.41 (d)	0.37 (d)	0.79 (a)	0.45 (c)
H11	Corruption	0.36 (d)	0.41 (c)	0.79 (b)	0.39 (d)
H12	New technology	0.54 (b)	0.87 (a)	0.76 (a)	0.37 (d)
	Technology absorption	0.42 (c)	0.38 (d)	0.63 (b)	0.45 (c)
	Competitors	0.87 (a)	0.72 (b)	0.97 (a)	0.53 (c)
H13	Technology transfer	0.45 (c)	0.47 (c)	0.52 (c)	0.5 (c)
	Exports	0.21 (d)	0.96 (a)	0.64 (b)	0.32 (d)
	New product	0.61 (b)	0.84 (a)	1 (a)	0.32 (d)

Source: Own work based on data from International Entrepreneurship Development Data. Country location according to quartile classification from 137 countries included in the ranking; marks indicate as follows: (a) Q1, (b) Q2, (c) Q3, (d) Q4.

4.5. Hypotheses Analysis

The analysis of the ecosystem level in this study is discussed along with the results of the working hypotheses and sub-hypotheses proposed in the causal model.

Table 4 summarizes the results of the analysis of the working sub-hypotheses. Below, a more detailed analysis of each hypothesis and sub-hypothesis is provided.

Table 4. Results of the analysis of the working sub-hypotheses.

Variables						
Working Hypotheses	Dependent	Independent	Cases	Category	Exp (B) (Odds Ratio)	Significance (p Value)
H2a The approach to successful business stories and role models fosters risk-taking attitudes.	Fear of failure (ACT_FRAC)	Met entrepreneurs in recent years (ACT_INI)	550	No. Ref = Yes	1.144	0.548

Table 4. Cont.

Variables						
Working Hypotheses	Dependent	Independent	Cases	Category	Exp (B) (Odds Ratio)	Significance (p Value)
H2b The approach to successful business stories and role models influences potential entrepreneurs to start their businesses.	Currently running a business (AEC_EMPR2)	Met entrepreneurs in recent years (ACT_INI)	550	No. Ref = Yes	0.427	0.00
H3a Previous entrepreneurial experiences influence favorable attitudes and perceptions towards entrepreneurship.	Career status (ACT_BA)	Entrepreneurial experience (RE_INI)	550	No. Ref = Yes	0.546	0.045
H3b Previous entrepreneurial experiences influence intentions to start a business.	Entrepreneurial intentions (EMPR_INT2)	Entrepreneurial experience (RE_INI)	303	No. Ref = Yes	0.346	0.00
H6a People who consider having the necessary skills to start a business find greater motivation to carry out entrepreneurial actions	Currently running a business (AEC_EMPR2)	Knowledge and skills perception (ACT_HAB)	550	No. Ref = Yes	0.392	0.00
H8a Ventures derived from EPN bring knowledge and innovation from the academy to the market.	Degree of innovation in product or service (EMPRE_INNO2)	Origin of the main business idea linked to EPN (IDEAP_EPN2)	37	No. Ref = Yes	0.438	0.238
H8b Ventures derived from EPN promote productivity and economic growth.	Sales level (EMPR_VENTAS2)	Origin of the main business idea linked to EPN (IDEAP_EPN2)	37	No. Ref = Yes	0.772	0.761

H1. Ecuador, compared to the rest of the countries part of GEI 2019, was characterized by a high risk of running a business, reflecting a low availability and reliability for corporate financial information, the protection of creditors by the law, and institutional support for transactions between companies. The depth of the capital market was medium-low to the size and liquidity of the stock market and the debt and credit market. In addition, Ecuador had a low globalization index, estimated on foreign investment, import restrictions, and other foreign trade indices. When institutions limit access to financial capital, entrepreneurs depend on their funding sources; this usually occurs in economies with less economic freedom and is often accompanied by high levels of corruption. In these cases, networking could promote participation in entrepreneurship (Boudreaux & Nikolaev, 2019; Guerrero et al., 2021).

H2. iEcosystem's indicator of entrepreneurs' knowledge was medium-high. Risk perception was at a medium-high level, showing the optimal level of people for whom fearing failure would not impede beginning a business. However, Entrepreneurial Activity in the Total Early Stage (TEA) was low in high- and medium-technology sectors. Similarly, the alumni who participated in the study found positive attitudes toward entrepreneurship. In this line, [Rodríguez-Gutiérrez et al. \(2020\)](#) highlight that a favorable institutional matrix influences entrepreneurs' intentions to start a venture. Additionally, the involvement of alumni in support activities for entrepreneurship and others related to innovation was found, as several have carried out actions to start a business or run at least one. Furthermore, the participants fulfilled the role of disseminators of knowledge through their participation in management or technical advisory committees.

- **H2a.** The logistic regression analysis results showed no statistically significant association (p -value = 0.548) between knowing someone who started a business in the past three years and considering the fear of failure as a limitation to starting a business. A weak causal effect might explain this result. [Aparicio et al. \(2021b\)](#) suggest that exposure to role models may reduce fear of failure. However, [Wyrwich et al. \(2016\)](#) argue that the relation between role models and fear of failure is mediated by the institutional context, consequently, a reduced effect of can be found when the institutional environment discourages entrepreneurial activity. Accordingly, observing failed experiences of entrepreneurship may induce fear of failure. This study collected data during the COVID-19 health crisis, in this context, negative experiences such as business' closings, unemployment growth, difficulty accessing providers and markets fostered fear of failure ([Kariv et al., 2022](#)).
- **H2b.** The logistic regression analysis results indicate a statistically significant relationship (p -value = 0.00). Not knowing someone who started a business in the past three years reduces the probability of starting a business (odds decrease by 57.3%). In this sense, [Soria-Barreto et al. \(2017\)](#) and [Urbano et al. \(2019b\)](#) observe that role models motivate the decision to start a business.

H3. The perception of the high status of successful entrepreneurs and the consideration of entrepreneurship as a good career was medium-low. Similarly, motivation by opportunity (companies in TEA started with the motivation of opportunity) is at a medium-low level. The individual level, on the contrary, indicates that EPN's alumni consider starting a business a good career alternative.

- **H3a.** Not having started a venture reduces the probability of considering entrepreneurship as a good career alternative (represents 43.4% less odds of considering entrepreneurship as a good career alternative). [Krueger \(1993\)](#) argues that previous positive entrepreneurial experiences indirectly influence intentions through the aspiration to establish a business.
- **H3b.** The quantitative analysis indicated a statistically significant relationship (p -value = 0.00) and showed an odds ratio of 0.346, which suggests that not having started a business reduces the probability of having intentions to start a business (reduces by 63.4% the odds of having intentions to start a business). [Krueger \(1993\)](#) claims that the perception of feasibility mediates the influence of previous entrepreneurial experiences on entrepreneurial intentions.

H4. Market agglomeration index reflected low opportunities in the market. Additionally, high market dominance can be observed; this may represent a greater difficulty for new business entry. In addition, informal investments were low. On the other hand, the perception of opportunities to start a business was high. Most alumni's ventures deal with products or services considered traditional or locally innovative; furthermore, according to their annual income, they are classified as micro or small businesses. Nevertheless, there are only a few businesses whose income has a share in the international market. These ventures may present a higher level of competitiveness and generate a more significant economic contribution. [Aparicio et al. \(2021a\)](#) suggest that export-oriented

entrepreneurship requires an adequate context, mainly characterized by an optimal quality of life, in addition to factors such as the ability to identify opportunities, support from the banking system, and access to communication in international markets.

H5. For 2019, Ecuador showed a low rate of the population enrolled in graduate education. In addition, at least with secondary education, the rate of business managers was low. In this sense, EPN's alumni have an advantage over the rest of the entrepreneurs, since they at least have third-level studies. However, the EPN or another university did not significantly influence the development of their products or services.

H6. In the ecosystem level, the perception of skills necessary to start a business index was high.

- **H6a.** Not having the knowledge and skills to undertake reduces the odds of undertaking by 60.8%. A statistically significant relationship was found (p -value = 0.00) and an odds' ratio of 0.392.

H7. The business strategy index reflected a low business capacity to execute positioning strategies and apply innovative resources to produce and develop services in Ecuador. Similarly, a low investment propensity in the training of personnel in companies was observed.

H8. The technology transfer index was medium–low; this groups a set of parameters, including the investment of private companies in R&D, cooperation between universities and industry, the quality of scientific research, and the protection of intellectual property. The mentioned before is consistent with the results obtained at the organizational level, as most participants reported that intellectual property was not a critical factor in starting their business and only one in four reports that a founder is the author of the intellectual property. Furthermore, participants' ventures registered expenses in R&D and marketing; these aspects are relevant for developing innovative products, services, and processes. Companies that invest in acquiring knowledge through internal and external mechanisms and promote the commercialization of new ideas drive innovation and economic growth (Acs et al., 2009). On the other hand, marketing is one of the aspects that help startups grow and survive failure (Amjad et al., 2020).

- **H8a.** Despite the above, no statistically significant association was found (p -value = 0.238) between the ventures of the alumni whose main business idea was associated with EPN and having products or services considered innovative at a national or international level. Lack of statistical significance may be explained due to a small size of the sample.
- **H8b.** No statistically significant association was found (p value = 0.761) between the ventures of the alumni whose main business idea was related to the EPN and the generation of a high level of annual sales (USD 100,001 to USD 1,000,000). This result might also be due to an insufficient size of the sample.

H9. Gazelle indicator, which indicates companies in TEA with high job creation expectations, was low. One of the explanations for the low economic impact is the large share of employment in low-productivity sectors. According to Mendieta Muñoz and Pontarollo (2018), the agriculture and construction sectors are characterized by low productivity in Ecuador. On the other hand, the participation of firms in the financial sector and manufacturing may positively affect economic growth. Although, the concentration of these sectors in the main cities limits their impact on other regions of the country.

H10. Regarding economic freedom as an ecosystem indicator, the ability to carry out a business in all its phases was low due to the complexity of the required regulations and the applied regulations.

This represents a difficulty in starting new businesses and promotes informality, which is common in Latin American countries, which, according to Guaipatin and Schwartz (2014) can reach 41% of national economic activity.

H11. *In 2019, there was a high perception of corruption in the Ecuadorian public sector. Corruption is an institutional element that limits entrepreneurship and innovation since opportunities in the market may be granted in exchange for private interests, increasing the risk of doing business and reducing government efficiency (Jiménez & Alon, 2018).*

H12. *There was a medium-high level of businesses in TEA that applied new technologies. On the other hand, Ecuador had a medium-low level of technological absorption and a low level of staff training. There was a high level of TEA companies in markets with little competition. While this institutional trait may appear positive by itself, market agglomeration prevents start-ups from benefiting. This relationship is important, as firms with high market power are more likely to invest in the adoption of new technologies and innovation (Alberto Botello & Guerrero Rincón, 2019). Moreover, Ecuadorian companies face additional obstacles, such as difficulty accessing financing, high costs and reduced information on technology, etc. (Carvache-Franco et al., 2022).*

H13. *At the ecosystem level, the medium-low level of technology transfer could be related to the low level of companies in TEA that have international clients. Nevertheless, a medium-high level of TEA businesses offered new products, at least for some customers. Collaborations with universities, public research institutes or established companies, and other accessible sources of knowledge such as conferences, patents, and scientific publications, among others, promote the dissemination of knowledge and, as well as investment in R&D, encourage the development of new products (Belitski et al., 2021). However, at the organizational level, the results showed a need for links to promote entrepreneurship from the EPN and other universities, as the primary source of business ideas was produced thanks to workspaces or through professional contacts. Spigel (2017) suggests material attributes that support entrepreneurship, such as access to university facilities or entrepreneurship support centers.*

Results from EPN's alumni context differ from the ideal performance of a well-performing academic entrepreneurial ecosystem. Most restricting effects in the Ecuadorian context originate from market agglomeration, reduced access to formal funding, and weak economic freedom that limits individual entrepreneurial actions and prevents organizations from seizing opportunities such as adopting new technologies and accessing to competitive markets. From the organizational level, universities act as a level mediator that potentially can reduce institutional constraints by promoting entrepreneurial education, start-ups incubation, financing, revealing role models, and networking with internal and external stakeholders. However, this study shows that EPN's influence on alumni's businesses is limited to networking through the participation of other alumni as founders or business partners and a small influence on business ideas originating from classes or theses. Individual entrepreneurial behavior requires institutional and organizational support. EPN's alumni showed, in general, entrepreneurially favorable traits, except for a moderate participation of fear of failure. This suggests that external environments, such as economic instability or societal attitudes, mediate the impact of role models.

5. Conclusions, Study Implications, and Limitations

This study investigated how university influences the entrepreneurial ecosystem in the context of Latin America. The methodology integrates data at multiple levels to explore relationships within the academic entrepreneurship ecosystem. Data analyses

employed both descriptive and relational methods to validate hypotheses and provided a comprehensive understanding of the dynamics at the micro-, meso-, and macro-levels.

The entrepreneurial ecosystem setting is defined by systemic influences starting at an institutional (macro) level that sets formal and informal ‘rules of the game’ and is mediated by organizations (meso-level) that influence individual traits of potential entrepreneurs (micro-level). The first research question looking for answer was what is the role of the university in the Latin American entrepreneurship ecosystem? Therefore, this study concludes that, while universities like EPN contribute to professional and technical capabilities and entrepreneurship attitudes, their influence on knowledge-driven, scalable business creation is constrained by institutional barriers. Consequently, the role of universities in Latin America’s entrepreneurial ecosystems may be significant on seeding potential entrepreneurs, but its impact is restricted by the context.

To answer the second research question: what are the limitations and opportunities that academic alumni’s businesses encounter in this ecosystem? At the institutional level, the most important limitations found were high market dominance, difficulty in access formal funding, corruption, and regulatory burdens that raise risk for doing business and limit innovation. At the organizational level, a scarce influence of university on alumni’s business was found. Finally, at the individual level, fear of failure may be a limitation factor for undertaking. Universities can improve business development by providing entrepreneurial education, networking, and early business experiences, plus the exposure to role models, success stories, and network building are considered effective mechanisms to enhance entrepreneurial intentions and improve the impact of universities. Particularly, in institutional contexts, such as the Ecuadorian context, nurturing self-efficacy, resilience and opportunity finding skills may foster entrepreneurial behaviors. Moreover, strengthening university–industry collaboration and influencing institutional reforms that improve business development, such as advocating for business transparency, access to funding, and support for knowledge-based businesses, are vital for leveraging the university’s full potential.

The mixed-methods approach applied in this research provides a model for researchers, administrators, and managers to develop a diagnostic framework that may be applied in the identification and implementation of systemic interventions aimed at enhancing the impact of universities in entrepreneurial ecosystems.

Future research should apply methods such as Partial Least Squares–Structural Equation Modeling (PLS-SEM) to test multi-level drivers of entrepreneurial behavior in challenging contexts. This study is not free of limitations; the data provided in the GEI 2019 limit the development of longitudinal studies on the role of entrepreneurship in economic growth because it was the last report conducted by GEDI in this field. Future studies should contextualize the entrepreneurship ecosystem based on iEcosystems through a combination of global indices, such as Bloomberg Innovation Index (BII), Global Innovation Index (GII), Global Competitiveness Report (GCR), European Innovation Scoreboard (EIS), Global Entrepreneurship Index (GEI), and Global Entrepreneurship Monitor (GEM). Moreover, the small sample size limits the evaluation of variables related to the alumni’s businesses. Due to the limitations of this study and systems being unique, dynamic, and self-replicative, this analysis may not be transferable to other systems.

Author Contributions: Conceptualization, R.V.-I. and A.R.-L.; methodology, R.V.-I. and A.R.-L.; software, R.V.-I.; validation, R.V.-I. and A.R.-L.; formal analysis, R.V.-I.; investigation, R.V.-I.; data curation, R.V.-I.; writing—original draft preparation, R.V.-I.; writing—review and editing, A.R.-L.; visualization, R.V.-I.; supervision, A.R.-L.; project administration, A.R.-L. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: This study has considered that it does not require an additional approval of an ethics committee as it complies with Ecuadorian legislation “Ley Orgánica de Protección de Datos Personales (LOPD)” —Organic Law on Protection of Personal Data. Under Article 7, the processing of personal data is legitimate and licit when consent is obtained for specific purposes. This research meets this requirement as participants have voluntarily provided their informed and unequivocal consent for the use of their data, with the study’s objectives and processing methods clearly outlined in the Informed Consent Statement, previously sent. This also ensures compliance with Article 8 of the LOPDP, as consent follows the principles: Free: Participants have provided explicit and voluntary consent. Specific: The study’s objectives and data use are clearly outlined, ensuring specificity Informed: All participants were fully informed of the processing details Unequivocal: The data collection process was designed to make the act of consent unambiguous. Furthermore, the study adheres to Article 26, which permits the processing of sensitive data for scientific research purposes. This study has compiled a declaration of ethnicity as the only data that may be considered sensitive according to LODPD. The research employs anonymization of participants, ensuring they cannot be identified, which further aligns with national legislation requirements. Finally, LOPDP provides additional exceptions to processing of personal data for scientific research under Articles 26, 32, and 36, allowing archival for historical, or statistical purposes. By meeting these conditions, the study complies with the national law’s specific provisions for handling personal data in a scientific context, thereby exempting it from additional ethical approvals.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study. Participation in the survey was entirely voluntary, and participants had the option to withdraw at any time if they chose not to complete the questionnaire.

Data Availability Statement: The data presented in the study are openly available in Open Science Framework OSF platform at <https://osf.io/ygv27/> (accessed on 13 February 2025).

Acknowledgments: The authors extend their gratitude to Escuela Politécnica Nacional for providing institutional support for this work. They also acknowledge the contributions of academic and research members from the Observatorio de la Organización y la Industria (O2i-EPN), whose cooperation was relevant for this study.

Conflicts of Interest: The authors declare no conflicts of interest.

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