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Performance measurement system for entrepreneurial universities

Itajubá, November 2025

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Performance measurement system for entrepreneurial universities

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ABSTRACT

This thesis investigates which dimensions, subdimensions and indicators are necessary in a performance measurement system for entrepreneurial Higher Education Institutions (HEIs). To achieve this, it identifies and compares the main performance measurement systems and the leading university entrepreneurship rankings, while also exploring scientific literature for the critical success factors for teaching and promoting entrepreneurship in higher education. As a result, the study structures a performance measurement system designed for entrepreneurial universities, which is applied to two Brazilian HEIs selected for convenience as case studies. The model defines parameters that enable HEIs to self-assess and improve their entrepreneurial performance, leading to the (re)orientation of their decision-making processes and institutional practices. Furthermore, it may contribute to enhancing the positioning of these institutions in national and international entrepreneurship university rankings. Ultimately, the thesis aims to contribute to scientific theory on the topics of organizational performance measurement and entrepreneurial higher education.

Keywords: Performance measurement, Entrepreneurial Universities, entrepreneurship in higher education, organizational performance, academic entrepreneurship.

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LIST OF ABBREVIATIONS AND ACRONYMS

ABEPRO	Brazilian Association of Production Engineering
ACEEU	Accreditation Council for Entrepreneurial and Engaged Universities
Anegepe	National Association for Entrepreneurship and Small Business Management Studies
APO	Management by Objectives
ARWU	Academic Ranking of World Universities
BSC	Balanced Scorecard
CAPES	Coordination for the Improvement of Higher Education Personnel
Cemp	Junior Enterprise Center
CenTev	Viçosa Regional Development Technology Center
CGU	Office of the Comptroller General
CNPq	National Council for Scientific and Technological Development
Conaes	National Commission for the Evaluation of Higher Education
CPC	Preliminary Course Concept
CWTS	Center for Science & Technology Studies
CWUR	Center for World University Rankings
EIUI	Entrepreneurial and Innovative University Index
EMBRAPII	Brazilian Industrial Research and Innovation Company
Enade	National Student Performance Exam
FNQ	National Quality Foundation
FORMICT	Form on Intellectual Property Policy for Scientific, Technological, and Innovation Institutions in Brazil
GCUB	International Cooperation Group of Brazilian Universities
GEM	Global Entrepreneurship Monitor
GLEU	Global League of Entrepreneurial Universities
GUESSS	Global University Entrepreneurial Spirit Students Survey
GUV	Global University Visibility
HEEACT	Higher Education Evaluation and Accreditation Council of Taiwan
HEI	Higher Education Institution(s)
IBEU	Brazilian Indicators of University Extension
ICT	Scientific, Technological, and Innovation Institution(s)
iESGO	Environmental, Social and Governance Index
IGC	General Course Index
IIFE	Index of Federal Entrepreneurial Institutes
INPI	National Institute of Intellectual Property
KPI	Key Performance Indicators
MBA	Master's in Business Administration
MCTI	Ministry of Science, Technology, and Innovation
MEC	Ministry of Education
NCEE	National Centre for Entrepreneurship in Education
NIT	Technological Innovation Center
NSLVE	National Study of Learning, Voting, and Engagement
Nudese	Center for Social and Educational Development

OECD	Organization for Economic Cooperation and Development
OKR	Objectives and Key Results
PDCA	Plan-Do-Check-Act
PDI	Institutional Development Plan
PMM	Performance Measurement Matrix
PMS	Performance Measurement Systems
PNQ	National Quality Award
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PTO	Tactical and Operational Plan
QS	Quacquarelli Symonds
RIUPS	Ibero-American Network of Health Promoting Universities
RUE	Ranking of Entrepreneurial Universities
RUF	Folha University Ranking
RUR	Round University Ranking
SDGs	Sustainable Development Goals
Sebrae	Brazilian Micro and Small Business Support Service
Sinaes	National Higher Education Assessment System
SIR	SCImago Institutions Rankings
SMART	Strategic Measurement Analysis and Reporting Technique
STEM	Science, Technology, Engineering, and Math
TCU	Federal Court of Accounts
TecnoPARQ	Viçosa Technology Park
THE	Times Higher Education
THEWUR	Times Higher Education World University Ranking
TÜBİTAK	Turkish Scientific and Technological Research Council
UFV	Federal University of Viçosa
UI	University of Indonesia
UN	United Nations
UNIRIO	Federal University of the State of Rio de Janeiro
WIPO	World Intellectual Property Organization

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1 INTRODUCTION

Higher education is an essential component of a productive economy, so that aspects such as excellence in teaching and learning, research and academic productivity, knowledge creation and transfer, and graduate employability, among others, have become indicative of a country's ability to compete globally (Hazelkorn, 2013). Higher education should become a strategic factor for economic development, improving the well-being of citizens, and safeguarding national interests, as it is one of the indicators that significantly affects a country's competitiveness index in the annual ranking conducted by the World Economic Forum and published as the Global Competitiveness Report since 2004 (Bazhenkov *et al.*, 2023).

According to Menshikov *et al.* (2022), an important strategic driver of a country's economic growth is entrepreneurial talent – understood as the set of skills that enable individuals to identify innovative opportunities and make decisions in uncertain environments. In 2024, Brazil recorded its highest level of entrepreneurship in the last five years, a figure driven by women and people aged 55 and over. This places the country as the second largest absolute population in the "potential entrepreneurs" category, only behind India (GEM Brazil, 2025).

The rapid growth of entrepreneurship globally is attributed to the power and quality of education in promoting the socioeconomic well-being of individuals and countries by directly impacting entrepreneurial activity. Thus, although it is essential to develop entrepreneurial talent from elementary school onwards, universities must become centers of entrepreneurship, capable of promoting innovation, knowledge transfer and regional development (Baliyan, Mosia and Baliyan, 2020; Menshikov *et al.*, 2022; Soam *et al.*, 2023).

Pupp & Filep (2021) point out that the role of universities in applied research, human capital formation and entrepreneurship is decisive for regional competitiveness. In Brazil, Higher Education Institutions (HEIs) play an important role in social and economic progress and in promoting a culture of innovation. Decree No. 9283, dated February 7, 2018, regulates Law No. 13243, dated January 11, 2016 (known as the Legal Framework for Science, Technology and Innovation), and authorizes universities to create environments that promote innovation, either through innovation ecosystems or through mechanisms for generating enterprises (Brazil, 2018). There is also Law No. 13267, dated April 6, 2016, which regulates the creation and organization of associations called junior enterprises, operating under HEIs (Brazil, 2016). In

addition, Complementary Law No. 182, dated June 1, 2021 (known as the Legal Framework for Startups and Innovative Entrepreneurship) provides that universities work with startups as partners, as solution providers, or in offering education and training to potential entrepreneurs (Brazil, 2021).

This is in line with the United Nations (UN) fourth Sustainable Development Goal (SDG) – Quality Education, through the development of social skills in students. Each country chooses its vision of the directions of education development that are relevant to it, and the prospects for its implementation (Dvoretzkaya *et al.*, 2023). In 2015, the SDGs were agreed upon by the 193 UN member states, but their success also depends on the actions and collaboration of other sectors, such as businesses and civil society. For companies, the SDGs represent opportunities, as they can help connect business strategies with global priorities (BNDES, 2019).

Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all (...)

4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent work and **entrepreneurship** (UN, 2024 – emphasis added).

To accelerate the development of entrepreneurs, universities around the world have begun to develop entrepreneurial education programs, with activities involving active learning – such as problem-based learning – and purposes like: (i) to focus on the skills, knowledge, abilities and capacities necessary for students to pursue entrepreneurship; and (ii) to offer a new worldview that incorporates entrepreneurial thinking, passion, autonomy and instrumentality, which can be applied in all dimensions of their personal and professional spheres (Llorente-Portillo *et al.*, 2024).

Studies such as Lundqvist & Williams (2006), Hofer & Potter (2010), Zhao & Feng (2016), Schmitz *et al.* (2017), Pitso (2019), Wang & Ma (2022), Chen & Zhu (2024) and Kizilaslan, Uysal and Turkyilmaz (2025) highlight that the central challenge is not only to produce knowledge but to efficiently convert it into economic and social value, something that requires consistent culture, incentives and support mechanisms throughout the university ecosystem. Universities play a strategic role in strengthening innovation and entrepreneurship ecosystems, being fundamental to sustainable development and economic competitiveness. Thus, the relevance of entrepreneurial universities is identified.

According to Rocha *et al.* (2021), appropriate institutional configurations in HEIs can foster entrepreneurial cultures, so that students benefit from education, idea development and business assistance (Shi *et al.*, 2019). By creating incubators and providing financial resources, consulting and access to technological tools, these institutions encourage and support the entrepreneurial intentions of their students (Choi *et al.*, 2017).

For Hronec (1994), performance measures should derive from the institutional mission statement and are the vital signs of an organization. They should be simple, analogous to activities, useful and easy to implement. They should keep pace with changes in strategic objectives and not only be improved but also replaced when necessary (Attadia & Martins, 2003). According to Tezza, Bornia and Vey (2010, p. 89), “organizational efforts to measure performance have been viewed by researchers and practitioners as a complete system, rather than a collection of autonomous models and tools.”

In this context of performance measurement as a strategic element, ranking systems are one of the means of pointing out to universities what should really be measured and how the information will be used to understand and improve work, rather than merely monitoring it (Bond, 2002; Sink & Tuttle, 1993).

Bazhenkov *et al.* (2023) state that global rankings of the scientific and educational activities of HEIs assess the quality of students’ preparation for their professional careers and are an indicator of the implementation of entrepreneurial and international university activities. The governance of HEIs is directly impacted by rankings, which generate intra- and extra-institutional pressures for educational quality (Calderón, Wandercil and Martins, 2019), and influence the decision-making of these institutions both regarding their internal agents and their relationship with the external environment (Fanelli & Carranza, 2018).

International comparisons are an inevitable legacy of rankings and are creating a sense of urgency, accelerating the pace of reform, and encouraging institutional behavior. Governments need to help institutions improve performance and quality; drive research excellence; provide better and more transparent information to students, prospective students and the public; and provide the basis for evidence-based policymaking (Hazelkorn, 2013).

In her book, Stack (2021) argues that, for many institutions, ignoring their university's ranking is tantamount to becoming invisible, and she asserts that the impact of such ranking systems extends far beyond campuses.

The study by Calderón, Wandercil and Martins (2019) found that university rankings have been the subject of scrutiny not only from social segments linked to demands for innovation and technology, but also from governments such as Angola, Cape Verde, Macau, Mozambique, Portugal and Brazil. According to Calderón *et al.* (2023), although Brazil has a growing presence in the rankings, they are poorly integrated into the strategic plans of public universities, and there is little production of informative content about them beyond institutional news and as a marketing tool for private universities.

Karlsdottir *et al.* (2023) point out that there is still no common framework of criteria for evaluating and measuring the performance of an entrepreneurial university and the engagement of academics with the activities of the third university mission. Dahlborg *et al.* (2017) state that the current system for evaluating the performance of HEIs, which rewards scientific publications and teaching activities, is insufficient as it does not adequately capture the socioeconomic impact of the efforts of the third university mission.

By focusing on cutting-edge scientific achievements, the ranking is unable to characterize the depth of an institution's teaching function. Therefore, given the limitations imposed by the methodological principles, characteristics and target audience of each ranking, the possibilities of assessing a university's competitiveness through these classifications should not be overestimated (Bazhenkov *et al.*, 2023). Ganga-Contreras *et al.* (2023) and Sponsler (2009) also consider that university rankings should not be used as the sole criterion in the development of public policies, but rather as one of the means for institutional evaluation.

1.1 RESEARCH PROBLEM

The research problem to be addressed is: what dimensions, subdimensions and indicators are necessary in a performance measurement system for entrepreneurial HEIs?

This question must be studied to define parameters that allow for the self-assessment of these institutions, with a view to improving their entrepreneurial performance. This could be

facilitated using a model that contributes to the (re)orientation of university decision-making processes and practices, with elements that could also be used to improve their positions in national and international university entrepreneurship rankings.

The problem is relevant to the Quality and Products research line of this Graduate Program in Production Engineering, since the definition of dimensions, subdimensions and indicators related to academic entrepreneurship for the proposal of a performance measurement system aims to develop a model for the quality management of HEIs, with an emphasis on innovation, continuous improvement and internationally recognized best practices in entrepreneurial education.

With reference to the aspects presented by Marconi and Lakatos (2003) for the evaluation of a research problem, it is understood that this thesis is **feasible**, as there are databases available, such as the Times Higher Education (THE) World University Ranking, the Quacquarelli Symonds (QS) Top University Rankings and the Entrepreneurial HEIs, which evaluate the performance of universities in innovation and entrepreneurship, and such data can be analyzed through case studies; **relevant**, as academic entrepreneurship plays a significant role in the formation of innovation ecosystems, regional development and the creation of startups; **novel**, as the specific emphasis on entrepreneurship is still an emerging field, so that the research can identify gaps and suggest new criteria to improve the assessment of entrepreneurship in universities; **feasible**, since the research can be conducted based on interviews with experts and access to secondary data sources, such as institutional reports – in this sense, it is noteworthy that the Brazilian Confederation of Junior Enterprises (Brasil Júnior) has shown interest in having its ranking as the subject of this study; and **timely**, given that understanding the factors that drive success in entrepreneurship can show a way for different institutions to improve their strategies for supporting academic entrepreneurs.

In terms of nature, the research is **applied**, as it has practical interest and aims to use its results to solve real-world problems. In terms of objectives, the research is **explanatory**, as it aims to identify the factors that determine or contribute to the occurrence of phenomena and deepens our understanding of reality. In terms of approach, the research is **qualitative**, as it considers that there is a dynamic relationship between the real world and the subject that cannot be translated into numbers, and is based on the interpretation of phenomena and the attribution of

meanings. As for the method, it is a **case study**, as it aims to stipulate a presumed set of causal links about the phenomenon studied, or "how" or "why" something happened.

1.2 GENERAL AND SPECIFIC OBJECTIVES

The general objective of this thesis is to structure a performance measurement system for entrepreneurial HEIs. As for the specific objectives:

- To identify and compare the main performance measurement systems and the leading national and international university rankings for entrepreneurship, with the aim of generating dimensions and subdimensions;
- To identify, in scientific literature, the critical success factors for teaching and promoting entrepreneurship in higher education with the aim of generating indicators;
- To structure a performance measurement system designed for entrepreneurial HEIs; and
- Apply the model to two Brazilian HEIs selected for convenience and analyze their results.

1.3 SCIENTIFIC JUSTIFICATION FOR THE TOPIC

In a search conducted on September 28, 2024, in the Scopus database (Scopus-Elsevier, 2024) with the keywords “Entrepreneurial Universities”, 1,319 publications were found. The first of these dates to 1983, and there has been a growing trend in publications, as shown in Figure 1.

In terms of geographical distribution, the United Kingdom publishes the most on “Entrepreneurial Universities”, as shown in Figure 2, with 203 works, followed by the United States (167 works) and Spain (116 works). Brazil ranks 7th, with 60 published works.

In terms of field of study, Business, Management and Accounting publishes the most on “Entrepreneurial Universities”, representing more than 30% (757 papers) of the total. It is closely followed by Social Sciences, with 27% (665 papers). Engineering appears in 4th place, with 191 papers (7.8%), as shown in Figure 3.

Figure 1. Number of publications on Entrepreneurial Universities (1983-September 2024)

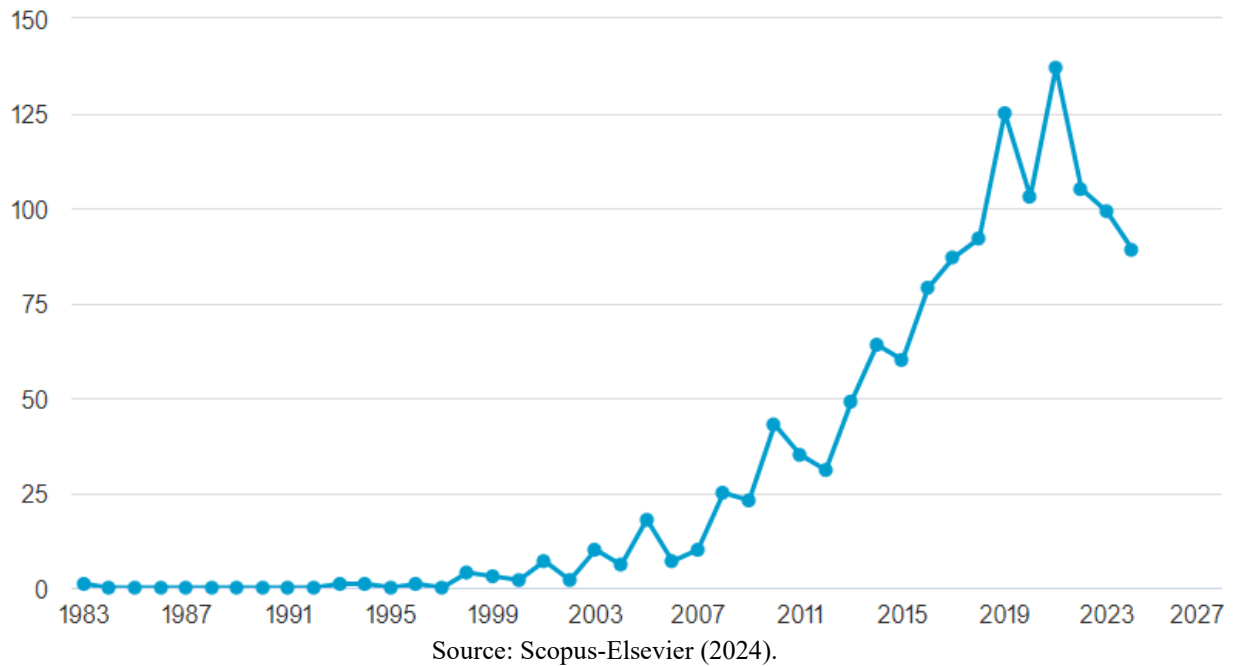
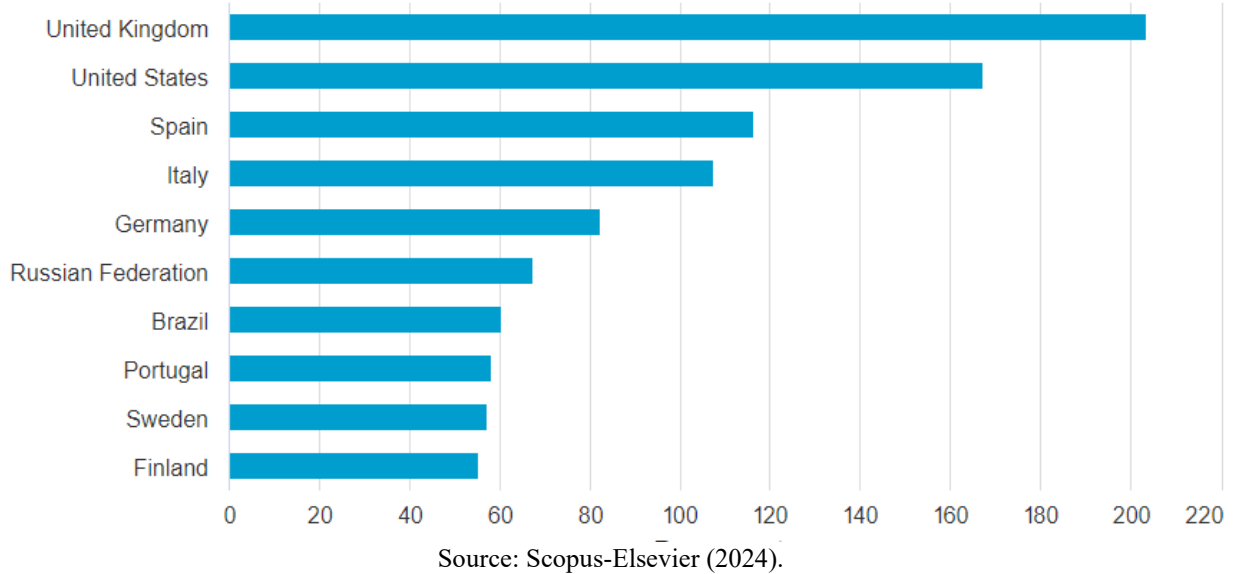


Figure 2. Geographic distribution of publications on Entrepreneurial Universities (1983-September 2024)

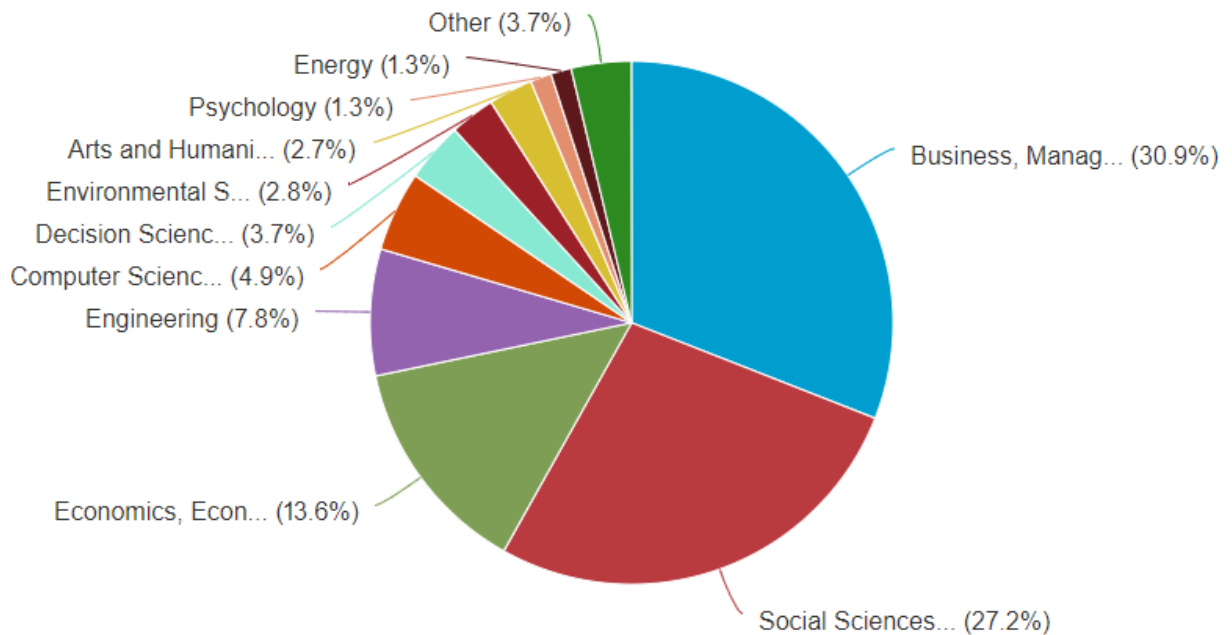


According to the search conducted, the five authors who have published the most on "Entrepreneurial Universities" are (Scopus-Elsevier, 2024):

- Maribel Guerrero, from Arizona State University (United States), with 36 published works;
- Henry Etzkowitz, from the international non-profit Triple Helix Association (Netherlands) and senior researcher at Stanford University (United States), with 35;

- David Urbano, from the Autonomous University of Barcelona (Spain), with 29;
- João J. Ferreira, from the University of Beira Interior (Portugal), with 14; and
- James A. Cunningham, from Newcastle University Business School (United Kingdom), with 13 published works.

Figure 3. Percentage of publications on Entrepreneurial Universities, by field of study (1983-September 2024)

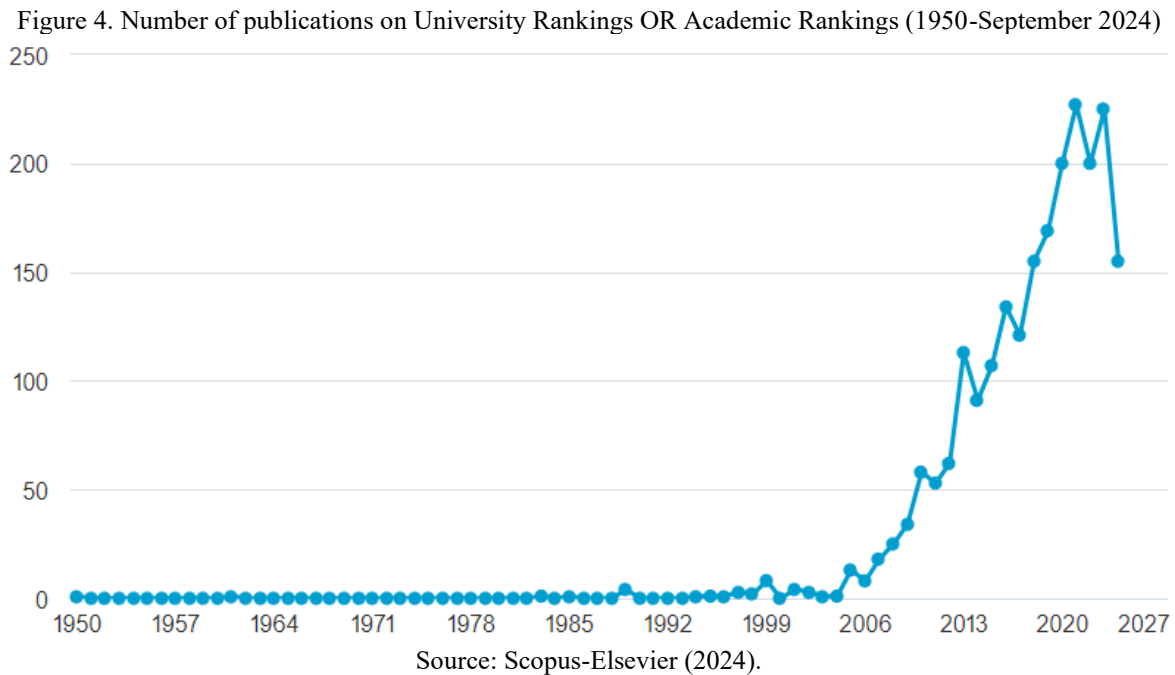


Source: Scopus-Elsevier (2024).

When limiting the search on Scopus-Elsevier to Brazil only, 70 publications were found (the first one was published in 2000) and the four authors who have published the most on "Entrepreneurial Universities" are:

- Paola Rücker Schaeffer, from Atitus Educação (Rio Grande do Sul, Brazil), with 6 published works;
- Guilherme Ary Plonski, from University of São Paulo (São Paulo, Brazil), with 5;
- Artur Tavares Vilas Boas Ribeiro, from University of São Paulo (São Paulo, Brazil), with 5; and
- Bruno Brandão Fischer, from State University of Campinas (São Paulo, Brazil), with 4 published works.

When searching for the keywords "University Rankings" OR "Academic Rankings" in the same Scopus database (Scopus-Elsevier, 2024), on September 28, 2024, the first record dates to 1950 and since then a total of 2,201 papers have been published, with an upward trend over the last fifteen years, as shown in Figure 4. Highlights for the years 2021 and 2023, with 227 and 225 publications, respectively, on the topic.



In terms of geographic distribution, the search showed that the country that publishes the most on "University Rankings" OR "Academic Rankings" is the United States, with 278, publications in Scopus. Brazil appears in 13th place, with 58 publications on the topic, as it can be seen in Figure 5.

In terms of field of study, Social Sciences published the most, representing 36% (1,376 papers) of the total, followed by Computer Science, with 15% (576 papers). Engineering appears in 4th place, with 230 publications (6%), as shown in Figure 6.

Regarding the authors with the most publications, the search showed that the five authors with the most publications on "University Rankings" OR "Academic Rankings" are (Scopus-Elsevier, 2024):

- Simon Marginson, from the University of Oxford (United Kingdom), with 14 published works;

- Domingo Docampo, from the AtlanTTic School of Telecommunications Engineering (Spain), with 13;
- Lutz Bornmann, from the non-profit scientific and technological research institution Max Planck Society (Germany), with 12;
- Ellen Hazelkorn, from Dublin Institute of Technology (Ireland), with 11; and
- Riyadh Ahmed Shahjahan, from Michigan State University (United States), also with 11 published works.

Figure 5. Geographic distribution of publications on University Rankings OR Academic Rankings (1950-September 2024)

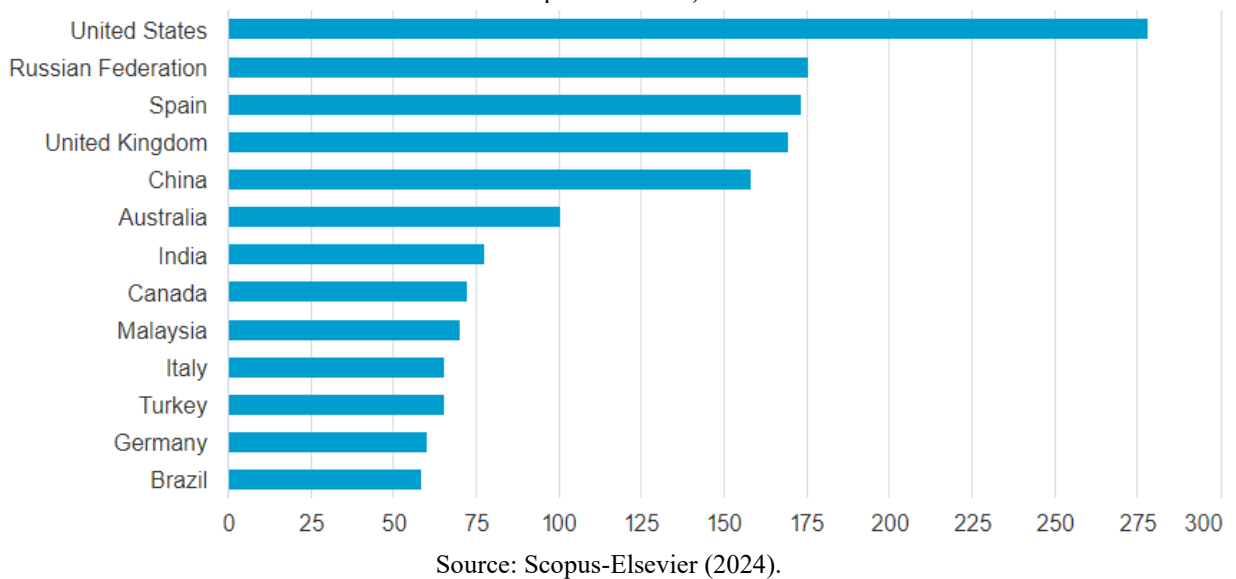
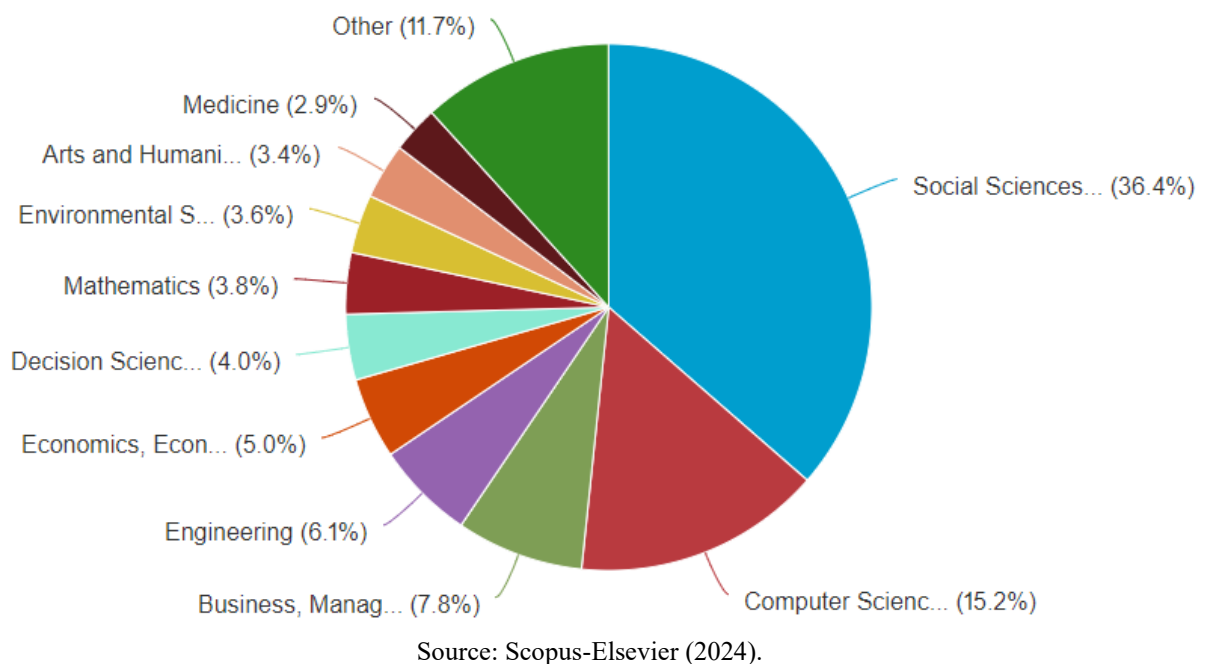


Figure 6. Percentage of publications on University Rankings OR Academic Rankings, by field of study (1950-September 2024)



When limiting the search on Scopus-Elsevier to Brazil only, 69 publications were found (the first one was published in 2012) and the five authors who have published the most on “University Rankings” OR “Academic Rankings” are:

- Adolfo Ignacio Calderón, from Pontifical Catholic University of Campinas (São Paulo, Brazil), with 6 published works;
- Marco Wandercil, from Municipal University of São Caetano do Sul (São Paulo, Brazil), with 6;
- Francisco Aníbal Ganga-Contreras, from University of Tarapacá (Chile), with 5;
- José Augusto Chaves Guimarães, from Júlio de Mesquita Filho State University of São Paulo (São Paulo, Brazil), with 3; and
- Eduardo Graziosi Silva, from Júlio de Mesquita Filho State University of São Paulo (São Paulo, Brazil), with 3 published works.

Based on the above, preliminary research on scientific production on the topics of this thesis indicates that there is room for exploration, particularly because the study in question is being conducted in Brazil.

1.4 STUDY LIMITATIONS

The Systematic Literature Review was conducted in the Scopus-Elsevier and Web of Science-Clarivate databases and was not restricted to public HEIs or the Brazilian context, to collect a more comprehensive and representative sample of the existing literature on (rankings of) entrepreneurial universities. However, it should be noted that the practical application of the performance measurement system structured in this study took place exclusively in Brazilian federal public universities. It is worth highlighting that the filter for the initial search was open access articles in Portuguese, English or Spanish for the period from 2014 to 2024. However, the application of the snowballing technique maintained only the language filter, thus expanding the records found to other types of publications from periods before and after that time frame.

The two HEIs under analysis, Federal University of Viçosa (UFV) and Federal University of the State of Rio de Janeiro (UNIRIO), were selected for convenience, in order to obtain opposite poles, implying choosing the federal public university best positioned in the overall

classification of the most recent Entrepreneurial HEIs ranking, carried out in 2023, and the federal public university that was ranked last. In this regard, it should be noted that attempts were made with Brasil Júnior to obtain the scores of the participants in each indicator of each dimension of the ranking. However, only data stratified by dimension was made available, so, for this reason, the research considered the scores of the indicators from the 2021 edition of the ranking, as these were the ones to which the author had access.

1.5 WORK STRUCTURE

The work is structured in six chapters, with Chapter 1 providing an introduction and presenting, in its five sections, the research problem, the objectives, the scientific justification for the chosen theme, as well as some study limitations.

Chapter 2 shows the research methods, consisting of a section for describing the Systematic Literature Review conducted, and another section for describing the six stages of the case study: definition of the conceptual-theoretical structure, planning of objects of analysis (cases), conducting the pilot test, data collection and analysis, and report.

Chapter 3 presents theoretical reference underlying the thesis, beginning with a section on Performance Measurement Systems and its eight subsections on the main concepts and six models of organizational performance assessment, as well as a comparison between them. The second section will address concepts related to Academic Entrepreneurship in its three subsections, while the third section will present, in three subsections, how the entrepreneurial performance of HEIs can be evaluated.

Chapter 4 discusses the performance measurement system model for entrepreneurial universities: after presenting the step-by-step construction of the model and the assessment of the three experts in entrepreneurship and innovation consulted, the following two sections will provide guidelines for use and the potential gains from its application in HEIs.

Chapter 5 displays the application of the model to UFV and UNIRIO, and analyzes their results.

Chapter 6 presents the conclusions, and, in two sections, it will highlight suggestions for future work, as well as present the publications resulting from this thesis to date.

2 RESEARCH METHODS

The conceptual modeling of the performance measurement system (PMS) for entrepreneurial universities was based on exploratory theoretical research into performance measurement systems (see section [3.1 “Performance Measurement Systems \(PMS\)”](#)), combined with a Systematic Literature Review for an in-depth theoretical research of the critical success factors for teaching and promoting entrepreneurship in higher education (see section [3.2 “Academic Entrepreneurship”](#)), as well as of the main means of assessing the entrepreneurial performance of HEIs (see section [3.3 “Evaluation of the Entrepreneurial Performance of HEIs”](#)). Additionally, the PMS was submitted for analysis by three experts in entrepreneurship and innovation (see [Chapter 4 “PMS Model for Entrepreneurial Universities”](#)).

The validation of the model for entrepreneurial universities was carried out through two cases, UFV and UNIRIO, selected for convenience to obtain opposite poles (see [Chapter 5 “Results and Discussion”](#)).

2.1 SYSTEMATIC LITERATURE REVIEW

The Systematic Literature Review was conducted according to the guidelines of the PRISMA statement, which stands for Preferred Reporting Items for Systematic Reviews and Meta-Analyses. The PRISMA statement was first published in 2009 and updated over the last decade. It is a reporting guideline for systematic reviews, not a methodological guide for conducting the systematic review itself (Page *et al.*, 2021). The search procedures were performed on December 2, 2024, in the Scopus-Elsevier and Web of Science-Clarivate databases and met the criteria established in Chart 1.

Chart 1. Descriptors and filters for the initial search

Search strings	Repository/Database	Search field	Database filters
entrepreneurial AND universities AND ranking	Scopus	Title, abstract and keywords	- Open Access; - Document type: article; - Year of publication: 2014 to 2024; - Languages: Portuguese, English and Spanish.
	Web of Science	Topic	- Open Access; - Document type: article; - Year of publication: 2014 to 2024; - Languages: Portuguese, English and Spanish.

Source: author.

The search results for each database can be viewed in Table 1. These results were exported to Mendeley software in RIS format to consolidate and verify duplicate studies and to follow the PRISMA statement guidelines.

Table 1. Initial search results

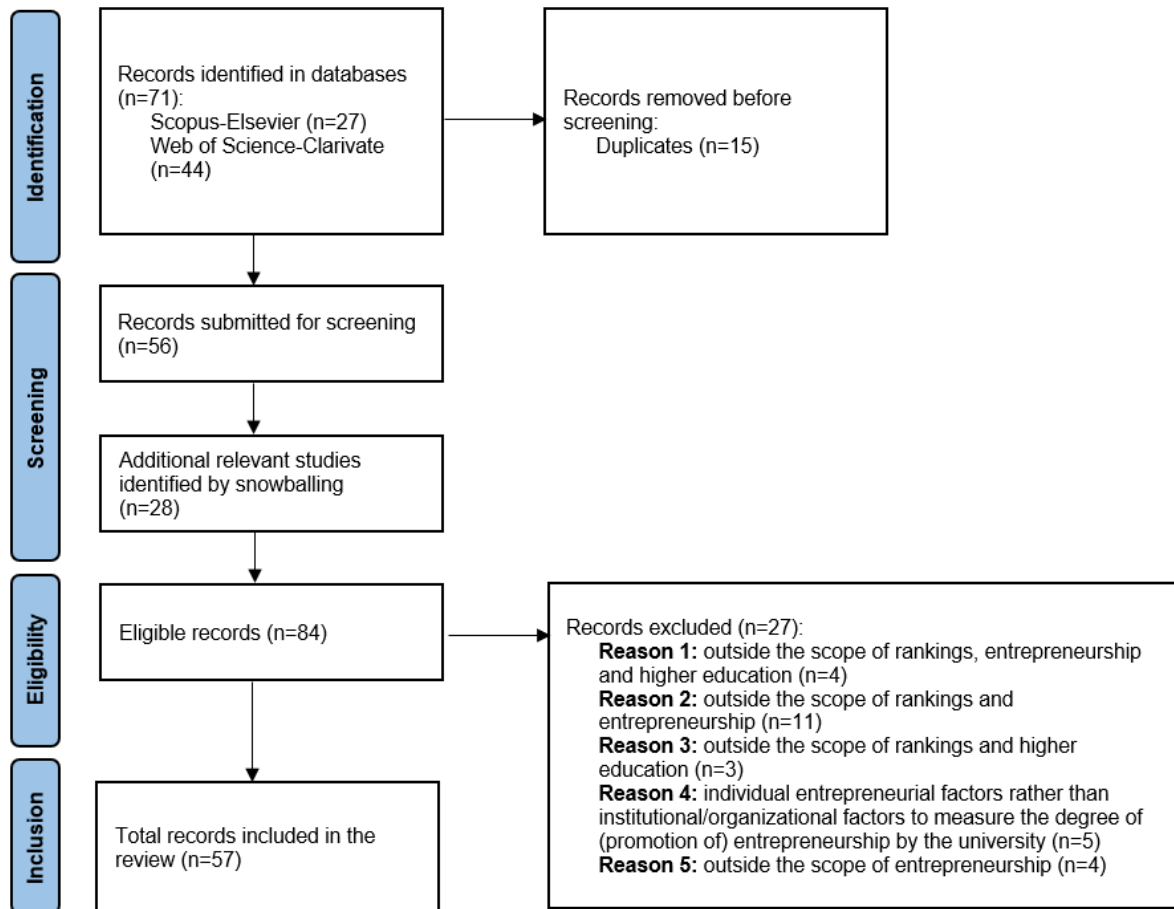
Database/Repository	Scopus	Web of Science	Total
Result	27	44	71
Search date	December 2, 2024		

Source: author.

In accordance with the four-step flow diagram required by the PRISMA statement – identification, screening, eligibility and inclusion (Page *et al.*, 2021) –, the procedures adopted at each stage are described below.

- I. In the identification stage, based on the initial search in the databases consulted, a total of 71 articles were found. Fifteen duplicate articles were then removed, leaving a total of 56 articles selected for analysis of title, keywords and abstract.
- II. In the screening stage, the complementary snowballing technique was applied to the 56 articles identified, which consists of analyzing the references listed in each article initially selected for possible inclusion of other relevant works. To collect a more comprehensive and representative sample of the existing literature, the only filter from the initial search that was maintained was that related to languages. Twenty-eight additional works (including articles, theses, dissertations and books) were then identified, totaling 84 eligible publications.
- III. At the eligibility stage, 27 works were not included in the final review, based on exclusion criteria grouped into five distinct reasons, as shown in the PRISMA flow diagram presented in Figure 7.
- IV. Finally, at the inclusion stage, 57 publications (detailed in [Appendix A](#)) were selected for final review. Reading these works allowed for their analytical categorization as presented in Chart 2, which will be explored in sections [3.2 “Academic Entrepreneurship”](#) and [3.3 “Evaluation of the Entrepreneurial Performance of HEIs.”](#)

Figure 7. PRISMA flow diagram



Source: author, based on the model by Page *et al.* (2021).

Chart 2. Analytical categories of publications selected for final review

Analytical categories	Theoretical reference
University rankings; rankings of entrepreneurial universities	1 (ALVES <i>et al.</i> , 2023)
	2 (BAZHENKOV <i>et al.</i> , 2023)
	3 (CALDERÓN <i>et al.</i> , 2023)
	4 (CALDERÓN, WANDERCIL and MARTINS, 2019)
	5 (CORRÊA, 2022)
	6 (DARWIN & BARAHONA, 2023)
	7 (DECUYPERE & LANDRI, 2021)
	8 (DOLCIMASCULO, 2020)
	9 (DVORETSKAYA <i>et al.</i> , 2023)
	10 (ELEVLI <i>et al.</i> , 2024)
	11 (FANELLI & CARRANZA, 2018)
	12 (FULLER & PICKERNELL, 2018)
	13 (FULLER, BEYNON and PICKERNELL, 2019)
	14 (GANGA-CONTRERAS <i>et al.</i> , 2023)
	15 (HAZELKORN, 2008)

Analytical categories	Theoretical reference
	16 (HAZELKORN, 2009) 17 (HAZELKORN, 2013) 18 (HAZELKORN, LOUKKOLA and ZHANG, 2014) 19 (KOCHETKOV, LARIONOVA and VUKOVIC, 2017) 20 (KRABEL <i>et al.</i> , 2018) 21 (LIAO & MAULANA SUPRAPTO, 2024) 22 (LOUWRENS, SOLOMON and PETTERSEN, 2023) 23 (PICKERNELL <i>et al.</i> , 2019) 24 (RIGHETTI, 2016) 25 (SPONSLER, 2009) 26 (STACK, 2021)
Academic entrepreneurship; entrepreneurial higher education	27 (AL AMIMI & AHMAD, 2023) 28 (ARAGÃO, DE JESUS and DOS SANTOS, 2022) 29 (BALIYAN, MOSIA and BALIYAN, 2020) 30 (BEZANILLA <i>et al.</i> , 2020) 31 (BRONSTEIN & REIHLEN, 2014) 32 (CHAI, 2019) 33 (DICK-SAGOE <i>et al.</i> , 2023) 34 (DOS SANTOS, 2024) 35 (ETZKOWITZ <i>et al.</i> , 2018) 36 (ETZKOWITZ, DE MELLO and ALMEIDA, 2005) 37 (FARRELL <i>et al.</i> , 2024) 38 (FERNÁNDEZ <i>et al.</i> , 2018) 39 (KARLSDOTTIR <i>et al.</i> , 2023) 40 (KONAK <i>et al.</i> , 2024) 41 (LIMA & SILVA, 2024) 42 (LIN & SHEN, 2019) 43 (LLORENTE-PORTILLO <i>et al.</i> , 2024) 44 (LU <i>et al.</i> , 2023) 45 (MENSHIKOV <i>et al.</i> , 2022) 46 (MISIAK-KWIT, WISCICKA-FERNANDO and FERNANDO, 2021) 47 (PUPP & FILEP, 2021) 48 (RUIZ & MARTENS, 2019) 49 (SILVA <i>et al.</i> , 2021) 50 (SIRITEERAWASU & NIRAMITCHAINONT, 2022) 51 (SOAM <i>et al.</i> , 2023) 52 (SULKOWSKI, SELIGA, and WOZNIAK, 2019) 53 (TORRES, 2020)

Analytical categories	Theoretical reference
	54 (UZIEL, DA SILVA and DE ARRUDA, 2024)
	55 (VAN DE BURGWAL, DIAS and CLAASSEN, 2019)
	56 (VEKIC <i>et al.</i> , 2020)
	57 (YANG, 2024)

Source: author.

2.2 CASE STUDY

According to Cauchick Miguel (2007, p. 223), a case study is “a kind of history of a phenomenon, extracted from multiple sources of evidence where any fact relevant to the chain of events that describe the phenomenon is potential data for analysis”. According to the author, the main objective is theoretical contribution, whether in proposing a new theory, extending the current theory or refining it. According to Voss, Tsikriktsis and Frohlich (2002), a case study can be retrospective – when it collects historical data, making it more difficult to determine causal relationships – or longitudinal – when it investigates the present, which may suffer from limitations of access to data of interest and time consumption.

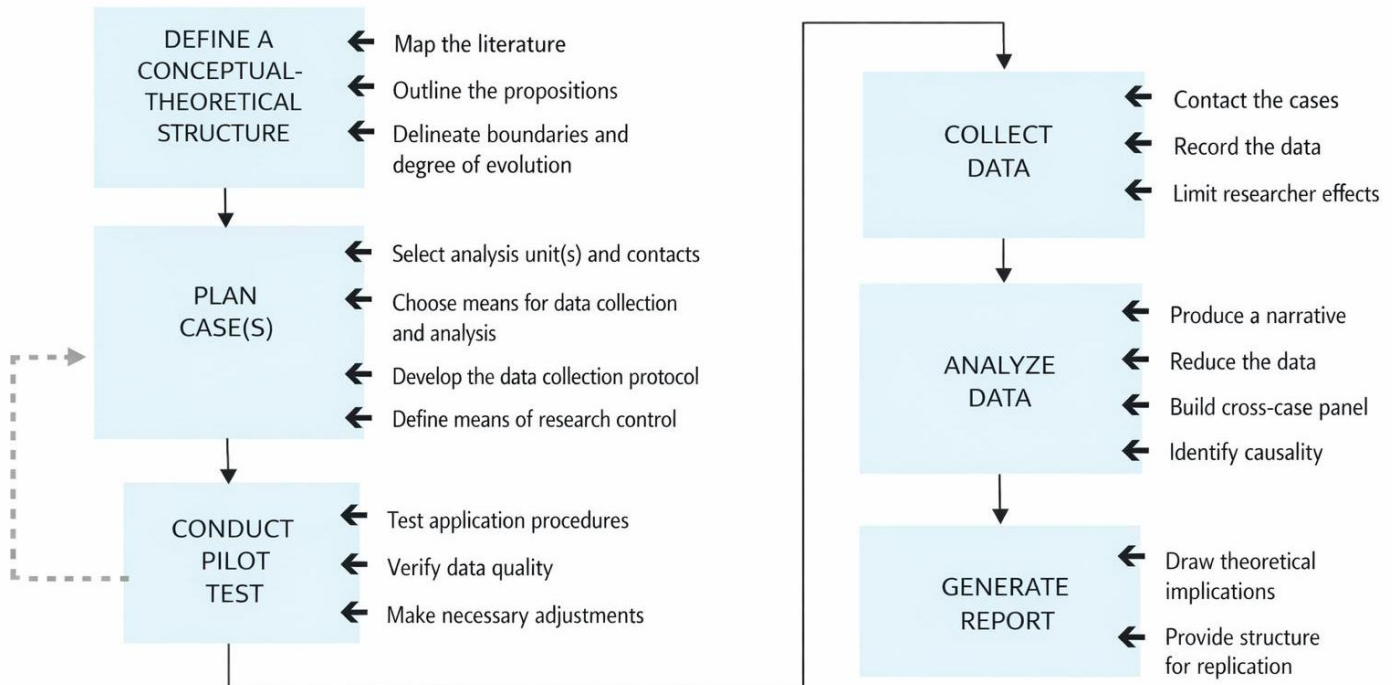
One of the main advantages of case studies is that they increase the chance of determining the connection between cause and effect. Hence the importance of identifying the sequence of events studied and the relationships between them. Other advantages of applying this method include: (i) the phenomenon can be studied in its natural setting, and relevant theories can be generated from the understanding gained from observing current practice; (ii) it allows us to answer the questions “why”, “what” and “how” with an understanding of the complexity and nature of the phenomenon as a whole; (iii) it lends itself to exploratory investigations, where the variables are still unknown and the phenomenon is not fully understood (Voss, Tsikriktsis and Frohlich, 2002).

Cauchick Miguel (2007) proposed content and sequence for conducting a case study, as shown in Figure 8.

According to Yin (2001), one of the techniques for case study analysis is pattern combination logic, which means comparing a pattern based on empiricism (i.e., the findings of the case study) with a pattern predicted before data collection (or several alternative predictions). Case studies can be used for different types of research purposes: explanatory (causal) – to establish

causal relationships and explain why something happens; descriptive – to describe an existing phenomenon in detail; or exploratory – to explore new phenomena or little-known situations.

Figure 8. Steps for conducting the case study



Source: adapted from Cauchick Miguel (2007, p. 221).

If the case study is explanatory, the patterns may be related to the dependent or independent variables of the study, and the final explanation is likely to be the result of a series of iterations (Yin, 2001):

- Making an initial theoretical statement or an initial explanatory proposition;
- Comparing the findings from an initial case with this statement or proposition;
- Revision of the statement or proposition;
- Comparing the other details of the case with the revision;
- Comparing the revision with the findings from a second, third or more cases; and
- Repeating this process as many times as necessary.

In this thesis, the case study is retrospective, as it collects data from the results of the latest edition of Entrepreneurial HEIs, held in 2023, and also from the previous edition, held in 2021; from the Management Reports for the year 2024 (the most recent until the conclusion of the research) and from the current Institutional Development Plans; in addition to using the SciVal platform to compare the two HEIs selected for convenience as objects of analysis. Furthermore,

the case study is explanatory in nature, as it seeks to explain how to induce academic entrepreneurship through a PMS.

The steps taken in conducting this case study are presented below.

2.2.1 Definition of the conceptual-theoretical structure

A theory is a system of constructs and variables whose constructs are related to each other by propositions and whose variables are related to each other by hypotheses. Constructs are representations of a concept to be verified empirically, while propositions correspond to what will be verified (representation of the construct for measurement purposes) (Cauchick Miguel, 2007; Voss, Tsikriktsis and Frohlich, 2002).

When mapping the literature on the subject, the research topic (state-of-the-art) is located and shown how it is influenced by the existing bibliography, in addition to identifying theoretical and empirical works (Voss, Tsikriktsis and Frohlich, 2002). This is done in sections [3.1 “Performance Measurement Systems \(PMS\)”](#), [3.2 “Academic Entrepreneurship”](#) and [3.3 “Evaluation of the Entrepreneurial Performance of HEIs”](#).

Thus, Figure 9 represents the conceptual-theoretical structure of this thesis, explored in [Chapter 4 “PMS Model for Entrepreneurial Universities.”](#)

The variables, which correspond to elements or characteristics that measure the constructs and represent them operationally, are the thirteen subdimensions detailed in [Chapter 4](#):

Governance and Ecosystem Dimension:

- 1 Structure;
- 2 Strategy;
- 3 Collaborative innovation networks;

Tangible Enablers Dimension:

- 4 Finance;
- 5 Technology and innovation infrastructure;
- 6 Specialized human resources;

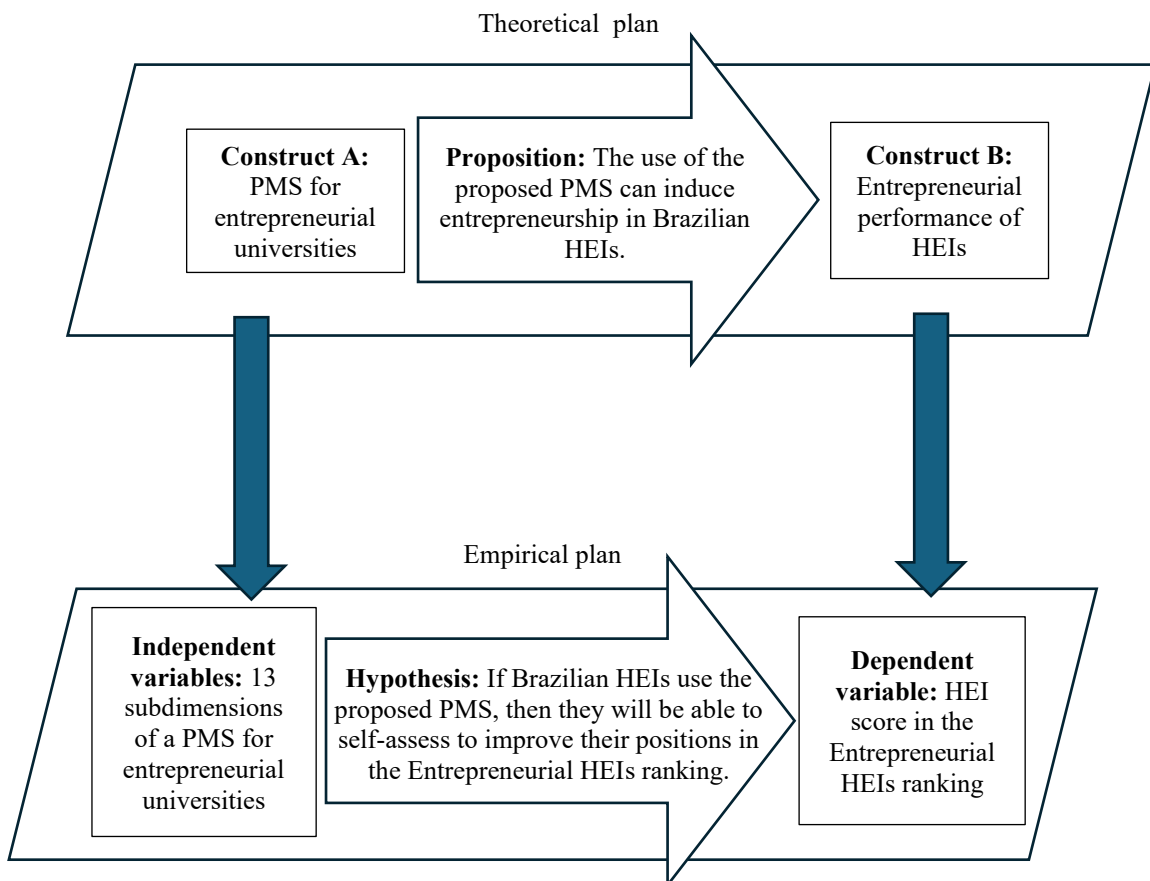
Entrepreneurial Training and Experience Dimension:

- 7 Entrepreneurship education and practice;
- 8 Scientific and technological research;
- 9 Extension;
- 10 Students and alumni;

Impact Dimension:

- 11 Social impact;
- 12 Economic impact; and
- 13 Environmental impact.

Figure 9. The theoretical and empirical plans of the research



Source: author, adapted from Bhattacharjee (2021).

2.2.2 Planning of objects of analysis (cases)

The initial criterion for selecting cases was to limit the selection to federal public universities that participated in the latest edition of Entrepreneurial HEIs, held in 2023. This ranking was chosen because it is already well established in Brazil. It has been held since 2016 and the

number of participating HEIs has been increasing with each edition, being frequently referenced in Brazil and worldwide (such as GLEU – item [3.3.3.11](#)). It started with 42 universities, increasing to 55 in 2017, 123 in 2019, and 126 in 2021. In the 2023 edition, with the merger of RUE and IIFE, 108 universities participated, including private (for-profit and non-profit) and public (federal and state) institutions, in addition to 31 federal institutes, totaling 139 participating HEIs.

Therefore, the next criterion was to obtain opposite poles, which meant choosing the federal public university with the highest overall ranking and the federal public university with the lowest ranking.

Thus, the objects of analysis were the Federal University of Viçosa (UFV), ranked 3rd among universities, with an overall score of 61.27 and the following scores by dimension: extension: 14.95; innovation: 7.71; entrepreneurial culture: 15.42; financial capital: 6.59; infrastructure: 11.66; and internationalization: 4.94. The Federal University of the State of Rio de Janeiro (UNIRIO), ranked 107th among universities, obtained an overall score of 27.16 and the following scores by dimension: extension: 5.84; innovation: 3.01; entrepreneurial culture: 8; financial capital: 4.01; infrastructure: 4; and internationalization: 2.31 (stratified data provided by representatives of Brasil Júnior on August 11, 2025).

2.2.3 Conducting the pilot test

According to Cauchick Miguel (2007), the purpose of the test is to verify the quality of the data obtained, aiming to identify whether they are associated with the constructs and, consequently, whether they contribute to meeting the research objectives. Based on the test, corrections and adjustments may be necessary.

In this thesis, the pilot test was replaced by the validation of the PMS proposal by three experts in the field of entrepreneurship and innovation, as presented in [Chapter 4](#). The purpose of the expert evaluation is to ensure the internal validity and construct validity, defined by Cauchick Miguel (2007, p. 226), respectively, as: “the level of confidence in the cause and effect between variables” and “the extent to which an observation measures the concept to be measured by establishing the correct operational measures in relation to that concept”.

In addition to the model itself, how it was constructed, the guidelines for its application by HEIs and the potential gains from using this PMS, the indicators were also submitted to expert analysis. The expectation was that they would assess the indicators' adherence to the attributes of usefulness to decision-makers and representativeness of what is to be measured, as defined by Uchoa (2013) and listed in item [3.1.1.1](#).

As recommended by Lima (2016), the selection of experts considered their position in the context of this research and whether they were suited to the issues the researcher wished to address. Thus, the minimum and desirable criteria presented in Chart 3 were adopted.

Chart 3. Minimum and desirable criteria for selecting experts to validate the model

Minimum criteria	Desirable criteria
Coordinate or have coordinated projects and/or programs and/or have taught courses in entrepreneurship and innovation	Have published works on entrepreneurial universities, entrepreneurship education, triple/quadruple/quintuple helices and innovation
	Have won awards/recognition/scholarships in the field of entrepreneurship and innovation
Work or have worked in academic administration at the director level and above in the field of entrepreneurship and innovation, or on the faculty with administrative responsibilities (such as course coordination)	Have been conducting research in the field of entrepreneurship and innovation at an HEI for at least ten years
	Working in innovation hubs (science and technology parks, startup incubators or accelerators, entrepreneurship centers, etc.) for at least ten years

Source: author.

The qualifications of the selected specialists are briefly presented below:

- **Expert 1:** professor at a federal public HEI since 1998. Experience in the field of Administration, with an emphasis on Entrepreneurship, working mainly on the following topics: entrepreneurship - entrepreneurial behavior, teaching entrepreneurship, knowledge management, administration and management tools. Experience in coordinating undergraduate Business Administration courses (2007-2011), as Deputy Secretary of the International Relations Secretariat (2013-2017) and as institutional coordinator of the Languages without Borders program (2012-2017). PhD in Language Sciences, master's degree in Production Engineering, undergraduate degrees in Linguistics, Language and Literature, and Hospitality Meeting and Travel Management.
- **Expert 2:** professor at a federal public HEI since 2011, teaching Marketing and Entrepreneurship courses. Experience as Director of Entrepreneurship and Innovation

at the HEI where she teaches. Creator of pre-acceleration programs (LAB001 - Pre-Acceleration of Hardware and Hard Sciences Startups). She has organized events such as Pint of Sciences, Startup Weekends Maker, NASA App Challenge and TEDx, directly impacting more than 25,000 students/entrepreneurs and around 500 startup projects. Awarded for best practice in entrepreneurial education at the Round of Entrepreneurship Education (2014) and alumni of the W30 Santander-UCLA Program, which brings together female leaders from universities to enhance leadership and future thinking. She was a methodology advisor for FIEMG Lab, the largest B2B startup acceleration program in Latin America (2019-2020). She served for three years as curator of Campus Party, the largest technology and web content event in Brazil. She is an advisor to startups and accelerates organizational culture projects. She is co-author of the books "Teaching Entrepreneurship in Brazil: overview, trends, and best practices" (2018), "The Propellers of Innovation - Volume 1: university-business-government-society interaction in Brazil" (2022), and "Propellers of Innovation - Volume 2: A Spiral of Ecosystems" (2025). She holds a master's degree in Production Engineering with an emphasis on product development and innovation, bachelor's degrees in Marketing and Business Administration, as well as training in Trend Hunting and a qualification in Entrepreneurial Education.

- **Expert 3:** professor at a federal public HEI since 2011, teaching courses related to Entrepreneurship and Innovation since 2008, both at the undergraduate level (25 courses) and in graduate programs (master's level, 8 courses). The subjects involve: Introduction to Entrepreneurship, Social Entrepreneurship, Technological Entrepreneurship, Introduction to Micro and Small Businesses, and current events (such as the 4th Industrial Revolution). She is the Director of Entrepreneurship and Innovation at the HEI where she teaches (2025-) and has coordinated projects related to Entrepreneurship and Innovation since 2012, totaling more than 25 projects that seek to connect the university to the local context, with benefits for students and those involved. She worked on the implementation of a Science and Technology Park (2010-2013), as a member of the Implementation Committee for this environment. Leader (2021-2027) of the theme "Interaction between University, Business, Government and Society - Triple and Quadruple Helix Models and Open Innovation" at the National Association of Graduate Studies and Research in Administration (ANPAD). Author of more than 100 publications on Entrepreneurial University, Triple, Quadruple and Quintuple Helix

published in graduate events in Administration and qualified journals in the area. She received honorable mentions at postgraduate events, such as the ANPAD Technological Innovation Symposium (2018), the XLIII ANPAD Meeting (2019), and the Triple Helix Conference (2021). Member of the winning team of the National Award for Best Innovation Hub from the National Association of Entities Promoting Innovative Enterprises (Anprotec) in 2024 and the international award "Triple E Awards - Community Engagement Initiative of the Year", achieving second place in the category. PhD in Business Administration, master's in Production Engineering and bachelor's in Business Administration.

The interview is one of the main research techniques and "consists of generating and maintaining conversations with people considered key in the research process (...), [whose] speech becomes the main record of the data" (Lima, 2016, pp. 27 and 29). In qualitative interviews, there is no attempt at statistical generalization, and the fluidity of the conversation improves the quality of the data collected. Among its characteristics are (Galtung, 1965):

- Minimal structuring;
- Use of interview scripts;
- Open and adaptable questions;
- Answers are not predictable;
- Spontaneity of the respondent's speech; and
- Maximum interviewer-respondent interaction.

Its main advantage lies in the wealth of information that can be gathered from the words and interpretations of respondents to the stimuli given to them, as well as the possibility of recording their nonverbal reactions. In addition, interviews provide researchers with the opportunity to explore their questions to the fullest and resolve doubts, since they are flexible and personalized interactions. It often allows for the clarification of situations or access to information that would not be noticeable through observation alone (Lima, 2016, p. 39).

According to Lima (2016), interviews are usually classified into three formats: structured, semi-structured and open-ended, the choice of which should consider the research situation, the topic investigated and the time available. Structured interviews are mainly used for administering questionnaires. In unstructured interviews, the interviewer relies on various topics and some initial questions to improvise according to the interviewee's answers. In semi-structured

interviews, the interviewer follows a certain number and order of main and specific questions but is free to include other questions. The respondent is equally free to express themselves, but the interviewer conducts the interview following a script (Galtung, 1965).

The preparation of a script is a fundamental requirement in semi-structured interviews, as it serves as a guide. Combesie (2004) states that the interview script needs to cover the list of topics, or aspects of the topic, that should be addressed before the end of the interview, with brief and clear notes. The order is constructed to foreshadow a likely development of the interview's sequence.

Regarding the conduct of the interview, Lima (2016) warns that the interviewer must take care to clearly define the meaning of the question when formulating it to the interviewee, since it is the content of the question that will give quality and consistency to the information collected. Here, it is worth noting that the interview consists of an interaction between the researcher and the research subject, which can be unsuccessful if this interaction is insufficient or excessive, or if the interviewee misinterprets the questions.

As for recording the interview, the use of a tape recorder is the most common form of recording, as it allows for full transcription. However, if recording is not possible, the interviewer-researcher should take as many notes as possible during the interview and prepare a report as soon as it is over (Lima, 2016).

The three experts were consulted individually on September 30 and October 4, 2025, using Google Meet videoconferencing. Semi-structured interviews were chosen, and the script in [Appendix C](#) was used to conduct the process. The type of recording was partial transcription, as presented in [Chapter 4 “PMS Model for Entrepreneurial Universities”](#).

2.2.4 Data collection

It should be completed when the amount of data and information is reduced and/or when it is considered that there is sufficient data to satisfactorily answer the research questions (Voss, Tsiriktsis and Frohlich, 2002).

The data collected from UFV and UNIRIO were analyzed in light of the dimensions, subdimensions and indicators defined in the PMS model constructed, presented in [Chapter 4](#), and the guidelines for data collection in institutional documents, discussed in the same chapter, were followed. The collection sought to identify evidence for the indicators presented in [Appendix B](#), in addition to identifying evidence for other relevant indicators, which are listed in [Chapter 5 “Results and Discussion”](#).

Drawing on the previous experience of the author and her advisor at the Secretariat of Higher Education of the Ministry of Education, representatives of Brasil Júnior were contacted to provide access to stratified data from the latest Entrepreneurial HEIs, conducted in 2023, with the scores of each participating HEI in each dimension of the ranking. At the time of the work experience at that Ministry, Brasil Júnior had already shown interest in having its ranking as the subject of this study and made available the stratified data with the scores of all participating HEIs, in each indicator of each dimension, from the 2021 edition.

In 2025, attempts were made with Brasil Júnior to obtain the same stratified data from the most recent edition, Entrepreneurial HEIs 2023, but only the scores by dimension were forwarded (see subsection [2.2.2](#)). For this reason, it should be noted that the scores from the 2021 edition of the ranking were considered, as these were the ones to which the author had access. Due to the selection criteria adopted (federal public universities that were at opposite ends of the spectrum in the latest edition of the ranking, from 2023), only the scores from UFV and UNIRIO were considered in this study.

In accordance with the recommendation made by Voss, Tsikriktsis and Frohlich (2002) regarding triangulation – which consists of using and combining methods to study the same phenomenon in order to avoid sharing the same weaknesses – the author conducted a documentary analysis of the UFV and UNIRIO Management Reports for 2024 (the most recent at the time of completion of the research) and the current Institutional Development Plans of the two universities, in addition to consulting the institutional websites of the selected HEIs and accessing the SciVal platform to compare the objects of analysis (SciVal, 2025).

Given that both the Entrepreneurial HEIs ranking and the secondary sources consulted are public, there is no question of data confidentiality for the cases studied.

2.2.5 Data analysis

The basis for the analysis is a detailed description of the case, but only what is essential and closely related to the objectives and constructs of the research. “Data analysis must be sufficiently robust to enable an effective link with current theory, leading to solid conclusions (...) [which] must be supported by the evidence collected and the analysis of the data, whose ultimate goal is to contribute to the theory” (Cauchick Miguel, 2007, p. 227).

This step is presented in sections [5.1 “Federal University of Viçosa \(UFV\)”](#), [5.2 “Federal University of the State of Rio de Janeiro”](#) and [5.3 “Comparison of the model between HEIs \(cross-referencing of information\)”](#).

2.2.6 Report

At this stage, the conclusions are compared with the theory to verify whether the existing literature can explain the phenomenon studied (dimensions, subdimensions and indicators necessary in an PMS for entrepreneurial HEIs) and support the evidence from the objects of analysis. It is the results and evidence that must be associated with the theory, enabling the generation of new theory (Cauchick Miguel, 2007).

This step is presented in section [5.4 “Discussion”](#).

3 THEORETICAL REFERENCE

3.1 PERFORMANCE MEASUREMENT SYSTEMS (PMS)

According to the Brazilian Association of Production Engineering (ABEPRO, 2025), among the subareas of knowledge related to Production Engineering, which guide this modality in undergraduate, graduate, research and professional activities, is Organizational Engineering.

As the name suggests, Organizational Engineering in Production Engineering refers to the set of knowledge related to the management of organizations, encompassing "strategic and operational planning, production strategies, **entrepreneurial management**, intellectual

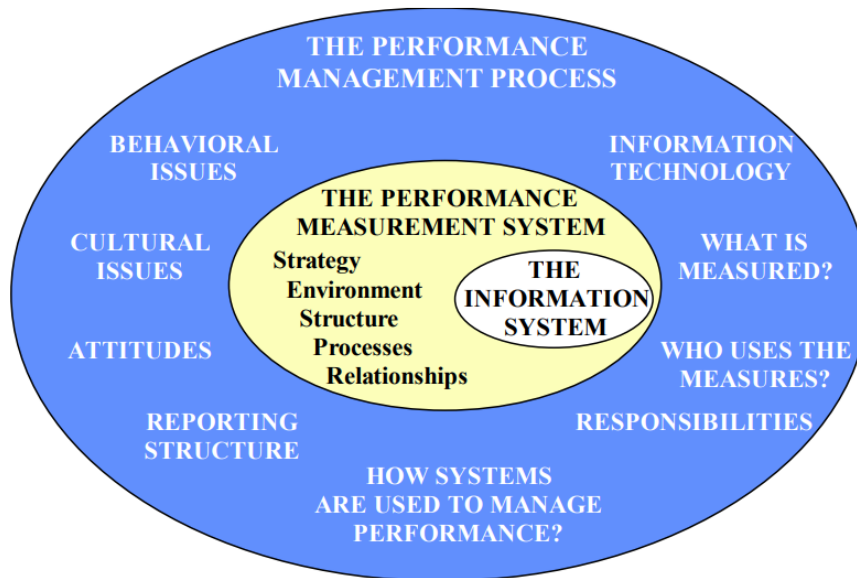
property, **organizational performance evaluation**, information systems and their management, and productive arrangements" (ABEPRO, 2025 – emphasis added).

It is important to begin with the definition of performance: "the potential for the successful implementation of actions in pursuit of objectives and goals" (Lebas, 1995, p. 23). Performance can also be understood as the result of a decision made (Kaydos, 1991). For Hronec (1994), performance is a process that can be measured in three categories and in each category, a stakeholder in the business must be identified, who is responsible for defining excellence:

- **Quality:** refers to the excellence of the products or services offered by the organization. It encompasses the quality of the organization (empathy, productivity, reliability, credibility, competence); the quality of the process (compliance and productivity); and the quality of the people (reliability, credibility, competence).
- **Time:** refers to the excellence of processes. It encompasses time in relation to the organization (speed, flexibility, responsiveness, adaptability); time in relation to the process (speed, flexibility); and time in relation to people (responsibility and adaptability).
- **Cost:** refers to the excellence of the organization and its economic performance. It encompasses cost in relation to the organization (financial, operational and strategic); cost in relation to the process (inputs and activities); and cost in relation to people (compensation, development and motivation).

According to Bititci, Carrie and McDevitt (1997), a performance management process is how an organization manages its performance in line with its corporate and functional objectives and strategies, and at the heart of this process is an information system called a Performance Measurement System (PMS), as shown in Figure 10. A PMS should enable the correct implementation of the organization's strategic and tactical objectives, as well as provide a structure that allows relevant information to be returned to the appropriate points to facilitate decision-making and control.

Figure 10. Performance management process and the position of the PMS



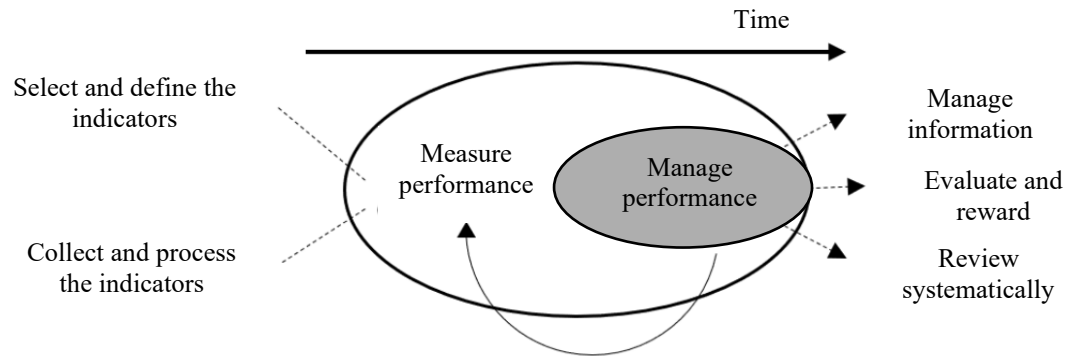
Source: Bititci, Carrie and McDevitt (1997, p. 5).

Therefore, performance management presupposes decision-making and action based on information derived from the performance measurement process (Cândido, Lima and Barros Neto, 2020). According to Neely *et al.* (1995), performance measurement is the process of measuring (quantifying) actions.

Performance measurement can be defined, generically, as the activity of determining performance measures, their extent, magnitude and evaluation, to adapt, adjust, provide or regulate some activity. When systematized, it is seen as an entity that aggregates an integrated set of individual indicators, which aim to provide information about the performance of certain activities for certain purposes (...). It can therefore be understood that the main objective of performance measurement is to indicate whether companies are on the right track to achieve their strategically established goals (Bond, 2002, pp. 6 and 7).

To differentiate between performance measurement and performance management, Cândido, Lima and Barros Neto (2016) highlight the processes that can be considered as **measuring** (selecting, defining, collecting and processing performance indicators) and **managing** performance (managing information, evaluating and rewarding, and reviewing the system), as shown in Figure 11.

Figure 11. Components and interrelationship between performance measurement and management



Source: adapted from Cândido, Lima and Barros Neto (2016).

The objectives assigned to performance measurement will depend on the vision of the organization's management, the structure (hierarchy) and the PMS support infrastructure (Bond, 2002). However, in general, a PMS is intended to serve as a basis for (FNQ, 2012):

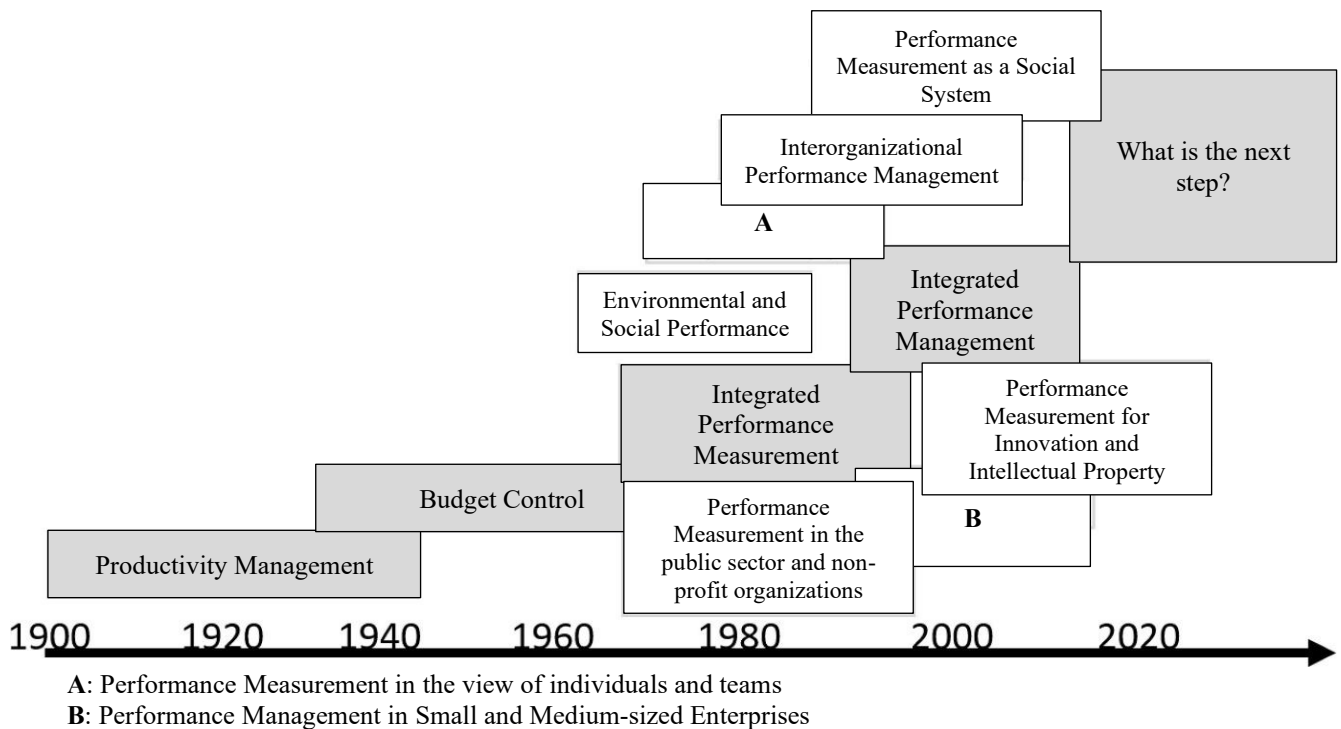
- Proactively analyze strategic problems before deviations occur;
- Support the search for new strategic paths for the organization;
- Support decision-making;
- Support organizational learning;
- Recognize collective dedication; and
- Communicate the strategies and priorities of senior management and managers.

There are many approaches to PMS at different levels, with the strategic level intensifying over time (Tezza, Borna and Vey, 2010). Figure 12 shows the evolution of the performance measurement literature.

Since the 1990s, there has been intense development in this area, to the point that it has been called “The Measurement Revolution” by Andy Neely, professor at the University of Cambridge, and “The Performance Manifesto” by Robert G. Eccles, professor at Harvard Business School (Bond, 2002). These new PMSs can be grouped into two distinct categories. The first category concerns those that emphasize self-assessment, such as the Deming Prize, the Malcolm Baldrige National Quality Award (United States) and the European Foundation for Quality Management. The second category concerns those PMSs designed to help managers

measure and improve business processes, such as the Balanced Scorecard and Performance Prism (Wongrassamee *et al.*, 2003) (see subsections [3.1.3](#) and [3.1.6](#), respectively).

Figure 12. Evolution of performance measurement literature



Source: adapted from Cândido, Lima, and Barros Neto (2020, p. 198).

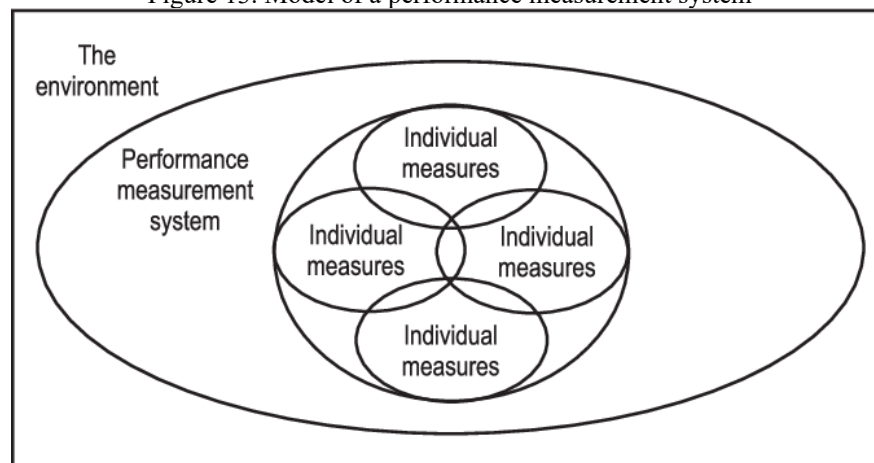
For Uchoa (2013), an institutional BSC needs to be comprehensive and balanced. That is, all units need to be directly or indirectly represented by one or more indicators (which does not mean that each unit must have its own indicator), and the organization must be fully represented by the BSC in a balanced manner. Neely *et al.* (1995) highlight the eleven main characteristics of a PMS:

1. Composed of financial and non-financial measures;
2. Aligned with the organization's market strategy;
3. Identifies market trends and the organization's progress;
4. Directs actions to be developed for continuous improvement;
5. Provides a better understanding of cause-and-effect relationships;
6. Highly dynamic;
7. Understandable to all members of the organization;
8. Ability to influence the behavior of all employees;

9. Affects the entire value creation process;
10. Provides valuable and up-to-date information; and
11. Evaluates the organization as a whole and not individuals.

Interaction with the environment – both internal and external – should be considered when implementing an PMS. Internally, as soon as strategies are created, the PMS should take control, with objectives and feedback. Externally, suppliers, customers and competitors must be considered (Bond, 2002). The theoretical model by Neely *et al.* (1995) proposes measuring performance at three different levels and is presented in Figure 13: performance measures can be viewed individually, but they can also be grouped together to form a PMS. Finally, the last level represents the interaction of the PMS with the organizational environment in which it operates (Attadia & Martins, 2003).

Figure 13. Model of a performance measurement system



Source: Neely *et al.* (1995).

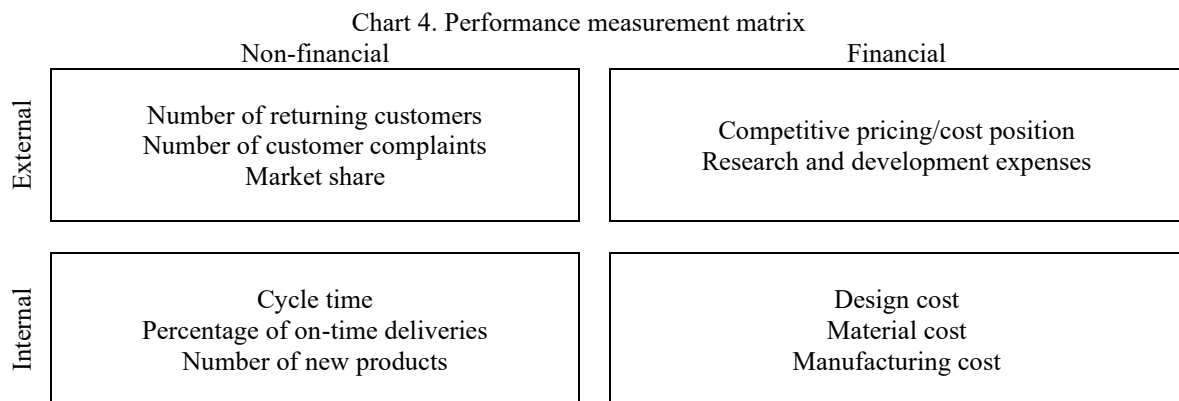
Bond (2002) mentions that a PMS should contain data to monitor the past and plan for the future, and is composed of several key elements, including: (i) a set of procedures for collecting and processing information; (ii) schedules and protocols for distributing information within or outside the company; (iii) an organizational learning mechanism to identify what actions can be taken for future performance improvement; and (iv) a process review that assesses whether the PMS is being regularly updated.

Measurement interferes with the reality being measured: the collection of information that will support higher-level decisions alters the context in which the information is collected, interfering with the results obtained. It should be borne in mind that the management and calculation of indicators derive directly or indirectly from procedures performed by people who have interests, suffer and generate pressures, and who cannot be considered fully impartial. Thus, when designing indicators,

managers need to be clear about the necessity, relevance and appropriateness of what information will be collected and how it will be collected, which involves knowledge of the means, the environment and the people involved in this process (Brazil, 2012, p. 25).

Keegan *et al.* (1989) state that the process of deciding what to measure consists of three steps:

1. Look at the strategy, defining the organization's objectives and determining how they can be translated into divisional goals and individual management actions;
2. Derive an appropriate set of metrics by filling out a performance measurement matrix, as shown in Chart 4. The authors suggest starting with five generic metrics: quality, customer satisfaction, speed, product/service cost reduction and cash flow from operations. It is essential to ensure that each of the metrics is integrated, both hierarchically and across business functions, and based on a deep understanding of the factors that influence the organization's costs;



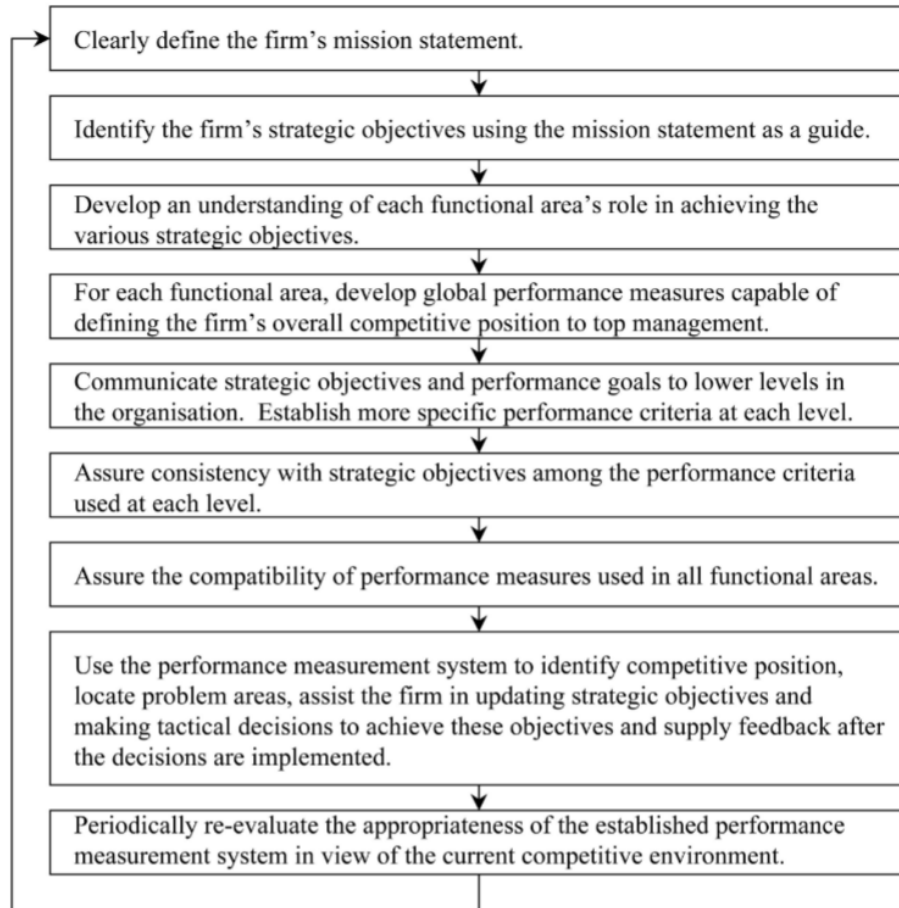
Source: adapted from Keegan *et al.* (1989).

3. Incorporate the performance measurement system into management thinking, possibly through the budgeting process. The authors emphasize that the critical issue is to close the management cycle and ensure that the PMS influences day-to-day decisions and actions, thereby ensuring that the organization's strategy is implemented.

Wisner & Fawcett (1991) also proposed a detailed nine-step process for designing a PMS (Figure 14), which is like that of Keegan *et al.* in that it reaffirms that metrics should be derived from strategy. However, the novelty was to make it clear that the PMS should be periodically updated (reassessed) considering the current competitive environment. The authors admit that it is impossible to develop a PMS that can be applied to every organization and that it is better

to develop a methodology for developing performance measures, “although a development structure is the PMS itself” (Lobo, 2003, p. 60).

Figure 14. PMS design



Source: Wisner & Fawcett (1991).

Finally, Uchoa (2013) also presents ten steps for building an institutional PMS, which are shown in Chart 5.

Chart 5. Steps for building an institutional PMS

Step	Details
1. Select an objective	The objective may be contained in the strategic map (see subsection 3.1.3) or belong to some other form of institutional strategic planning. It is recommended to start with the objectives most related to the institution's results (top of the strategic map).
2. Identify critical success factors (CSFs)	A CSF is a challenge, obstacle or constraint that, if not overcome, will prevent the objective from being achieved. CSFs are usually defined shortly after the strategic map is drawn up.

Step	Details
3. Choose indicators that represent the achievement of the objective (result indicators)	A result indicator refers to the effectiveness or impact of achieving the objective (see item 3.1.1.1).
4. Assess the quality of the indicators	Assess the adherence of the selected indicator to the attributes of institutional indicators (see item 3.1.1.1).
5. Establish an action plan to achieve the objective, considering the overcoming of CSF	An action plan should consist of activities and/or projects that help overcome the CSF and achieve the objectives.
6. Choose indicators that represent the success of the action plan (effort indicators)	Effort indicators should be chosen to achieve the objective, and this may involve efficiency, execution or input indicators.
7. Assess the quality of the indicators	Assess the adherence of the selected indicator to the attributes of institutional indicators (see item 3.1.1.1).
8. Repeat the previous steps for the other objectives.	
9. Analyze the set of defined indicators and adjust	Analyze the consistency of the developed system vertically: if the targets of the indicators at the base of the strategic map are achieved, is it reasonable to assume that the objectives at the top of the strategic map will be achieved?
10. Select the indicators that are relevant to the strategy	Reduce the number of strategic-level indicators to be monitored by senior management. The indicators not selected will be monitored by the organization's management levels.

Source: adapted from Uchoa (2013).

Next, other concepts and some models for assessing organizational performance will be presented. The criterion for selecting the PMS in this section was that the model should present dimensions and that the respective model theory should present a definition/description for each dimension. In addition, the most current and comprehensive model was considered in cases where a model defined/described a particular concept addressed in a previous model. In this sense, it is worth mentioning some examples of PMSs that were not included because they did not meet the criterion:

- *Hoshin Kanri* (or Policy Deployment): it consists of managing the guidelines of an organization's senior management. It is one of the three components of Total Quality Management, along with routine management and quality improvement teams (Albano, 2008). It emerged in a context of industrial reconstruction and restructuring in Japan after World War II. Starting in 1968, Japanese planning expert and professor Yoji Akao was responsible for systematizing and organizing this model. Like the Balanced Scorecard, *Hoshin Kanri* seeks to link short-term activities with long-term goals.
- *Quantum Performance*: a model introduced in 1993 in the book "Vital Signs", written by management and quality management expert Steven M. Hronec, *quantum*

performance can be defined as "the level of achievement that optimizes the value and service of the organization for its stakeholders: customers, employees, shareholders, environmentalists etc." (Hronec, 1994). It considers three families of measures (cost, time and quality). It provides a step-by-step guide for its application.

- Performance Pyramid or SMART Pyramid (Strategic Measurement Analysis and Reporting Technique): a model developed by Kelvin F. Cross and Richard L. Lynch in 1990, based on the concepts of Total Quality Management, Industrial Engineering and Activity-Based Costing. It structures performance in the form of a pyramid with four levels of objectives: organizational vision; business units; business operating systems; and departments. The left side of the pyramid looks at external effectiveness, and the right side looks at internal efficiency. A large organizational structure is necessary for its correct implementation.

3.1.1 Preliminary concepts

3.1.1.1. Key Performance Indicators (KPIs)

The acronym KPI derives from Key Performance Indicator, and its initial concepts were established in the 1870s during the industrial efficiency movement. These concepts were updated and popularized in the early 20th century by Frederick Taylor, an American mechanical engineer considered the father of scientific management, and Peter Drucker, an Austrian-American economist considered the father of modern management (Chief of Staff Network, 2023; Oboard, 2025).

In 1911, Taylor introduced data-driven worker productivity optimization and emphasized the importance of setting standards to measure performance against those standards. However, the term KPI was coined later. In 1950, Drucker developed the concept of Management by Objectives (MBO) and laid the foundation for structured performance measurement against predetermined objectives (Chief of Staff Network, 2023; Oboard, 2025). Both KPIs and Objectives and Key Results (OKRs, see item [3.1.1.2](#)) are offshoots of Drucker's original work.

Over time, the use of KPIs evolved as management practices advanced. In the 1960s, Total Quality Management, popularized by American statistician William Edwards Deming and Romanian-American electrical engineer Joseph Juran, introduced the concept of statistical process control and emphasized consistency, continuous quality improvement and customer satisfaction (Chief of Staff Network, 2023).

Advances in computer technology in the 1980s made it easier to track performance metrics. In the 1990s, the Balanced Scorecard (BSC, see subsection [3.1.3](#)) contributed further to the development and adoption of KPIs. In the 2000s, real-time monitoring of performance data became possible thanks to digital analytics tools (including big data, defined as a massive and complex set of data that cannot be processed by traditional data management systems).

In 2015, the emergence of mobile analytics and cloud computing facilitated the monitoring of work performance. In 2020, the adoption of KPIs was particularly driven by the COVID-19 pandemic, which led the entire world to work from home (Oboard, 2025).

KPIs are now widely used in industries and organizations of all sizes to identify where the organization is performing well and where improvements are needed (Chief of Staff Network, 2023). They are customized based on each organization's specific goals and priorities. The scope for applying KPIs can be general, departmental or individual.

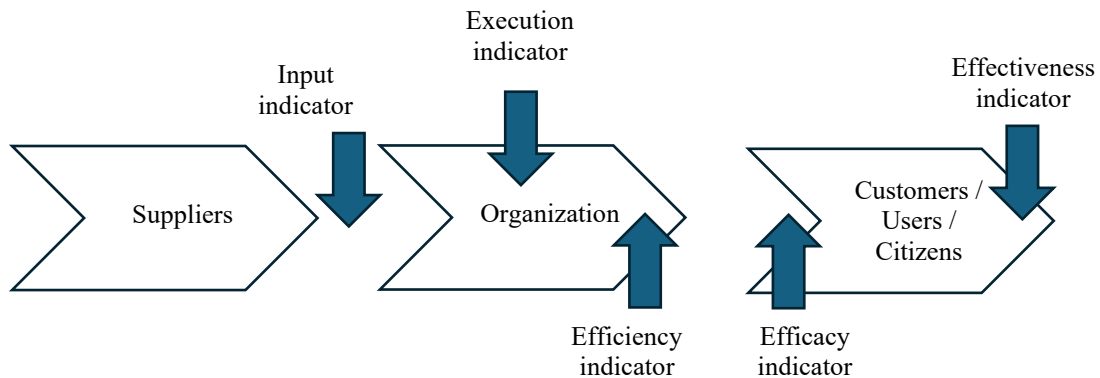
To be defined, it is recommended that KPIs follow the criteria of the acronym SMART, which stands for:

- Specific: avoid ambiguity to focus efforts;
- Measurable: establish criteria for monitoring progress;
- Achievable: they must be realistic and attainable;
- Relevant: they must align with broader organizational goals; and
- Time-bound: to create a sense of urgency.

According to Uchoa (2013), institutional performance indicators can be classified in various ways: by hierarchical level (operational, managerial, strategic); by theme (quality, cost, delivery etc.); by dimension or perspective (financial, human resources, customers etc.); or by position

in the value chain (inputs, execution, efficiency, efficacy, and effectiveness, and, as a result, in effort and outcome indicators – see Figure 15 and Chart 6).

Figure 15. Classification of indicators according to their position in the value chain



Source: adapted from Uchoa (2013).

Chart 6. Classification of indicators according to their position in the value chain

Effort indicators (or drivers)	Input indicators	Measure the amount of inputs or human, material, or financial resources spent or needed. Example: number of teachers hired.
	Execution Indicators	Measure the quantity executed. Example: number of students graduated.
	Efficiency Indicators	Measure the relationship between services delivered and resources expended (resources in general, not just those related to costs). Example: cost per student.
Outcome Indicators	Effectiveness Indicators	They measure how much of what needed to be delivered was actually delivered. Example: percentage of students with a final grade above nine.
	Effectiveness Indicators	They measure the impact of actions in the context, adding value to it. Example: percentage of students who passed the entrance exam.

Source: adapted from Uchoa (2013).

About the attributes of institutional indicators, especially in the context of public management, Uchoa (2013) refers to the work “Indicators: basic guidelines applied to public management,” published in 2012 by the then Ministry of Planning, Budget, and Management – now the Ministry of Planning and Budget – to list those presented in Chart 7.

Chart 7. Attributes of institutional indicators

Usefulness	Does the indicator communicate the intention of the objective, demonstrate what the organization expects from its workforce, and is it useful to decision makers?
Representativeness	Does the indicator accurately represent what is to be measured? This is the attribute of proximity of meaning and scope of the indicator in relation to the objective.
Methodological reliability	Are the methods used to collect and process the indicator reliable?
Source reliability	Does the data source provide the indicator accurately and precisely? In general terms, accuracy refers to the correct value and precision to close values.

Availability	Is it possible and easy to collect the data needed to calculate the indicator?
Cost-effectiveness	How much does it cost to obtain the indicator? The relationship between the costs of obtaining the indicator and the benefits of using it should be favorable.
Simplicity of communication	Will the audience who will see and use the indicator easily understand it?
Stability	Does a series of indicator measurements allow for consistent monitoring and comparisons, with minimal interference from external variables?
Timeliness	Is the indicator obtained based on current information? Can the indicator be obtained in time for use?
Sensitivity	Are variations in the process (whether or not resulting from intentional interventions) reflected in the indicator's result?

Source: adapted from Uchoa (2013).

Finally, it is worth noting the difference between metrics and KPIs: a metric is simply something to be quantified. KPIs, on the other hand, are criteria considered essential to the objective and progress of the business. A metric becomes a KPI when it is an important point for the organizational strategy (Dourado, 2024).

3.1.1.2 Objectives and Key Results (OKRs)

The acronym OKRs stands for Objectives and Key Results and differs from KPIs in both purpose and use. OKRs are more strategic in nature, providing a high-level overview. KPIs, on the other hand, are more tactical (quantitative indicators), designed to continuously monitor progress toward these objectives. Therefore, OKRs and KPIs can be used together to create a more comprehensive PMS (Chief of Staff Network, 2023).

In the OKR methodology, objectives are usually set quarterly, making results more tangible and allowing errors to be corrected quickly. Key results are reported weekly, to anticipate the end of the quarter. If the target result is not achieved, it is possible to learn and recover within the quarter, rather than waiting a whole year (Rocha, 2024).

The history of OKRs began in the 1970s, when Hungarian-American engineer Andrew Grove, then CEO of Intel, an American technology multinational, reinvented goal setting and focused it on measurable objectives. In the 1980s, American engineer John Doerr learned the concepts of the methodology from Grove and later, in 1999, introduced them to his colleagues at Google, an American multinational software and online services company. Throughout the 2000s, OKRs gained traction in the technology industry, with large companies implementing the framework, such as LinkedIn (a social media platform focused on business and employment),

X (formerly Twitter, a short text social network) and Uber (a platform for transportation services) (Oboard, 2025).

In 2017, Doerr published the book "Measure What Matters", in which he established a formula for setting goals, divided into: "I will" (objective) and "measured by" (set of key results). In other words, there are two main components in the OKR methodology (Rocha, 2024):

- Objectives (O): a concise and vividly described qualitative statement of the direction desired by the organization; and
- Key results (KR): quantitative goals with a direct impact on the achievement of the objective, if successfully achieved. Usually, two to five key results are defined for each objective.

In 2018, education and non-profit sectors also began to adopt the OKR methodology. More recently, in 2020, OKRs demonstrated their adaptability and relevance by proving to be a fundamental tool in the transition to remote work during the COVID-19 pandemic (Oboard, 2025).

By way of illustration, an example adapted from Rocha (2024) is presented below:

- Objective: Increase customer satisfaction by 20%.
 - Key result 1: Increase first contact resolution rate by 25%.
 - Key result 2: Reduce average wait time for service by 20%.
 - Key result 3: Implement a loyalty program that reaches 50% of the customer base.
 - Key result 4: Increase the number of positive brand reviews on review platforms by 20%.
 - Key result 5: Reduce the customer cancellation rate by 5%.
 - KPI 1: NPS (Net Promoter Score), to measure customer loyalty.
 - KPI 2: Average problem resolution time, to measure customer service efficiency.
 - KPI 3: Customer retention rate, to measure the percentage of customers who continue to do business with the company.

3.1.2 Results and Determinants Framework

A model developed in 1991 by management accounting professor Lin Fitzgerald, in partnership with other authors, after a study on performance measurement in the service industry, also called the Performance Measurement System for Service Industries. It is based on the premise that there are two basic types of performance indicators in any organization: those related to results and those focused on the determinants of results (Neely *et al.*, 2000). These two indicators are broken into performance dimensions, as shown in Chart 8.

Chart 8. Results and Determinants Framework

Indicators	Performance dimensions	Types of measures
Results (lagging performance indicators*)	Competitiveness: standing out and performing better than competitors.	Relative market share and position Sales growth Customer base measures
	Financial performance: provides an overview of the business in monetary terms. It presents an overview of the organization's financial health and profitability.	Profitability Liquidity Capital structure Market indices
Determinants (leading indicators)	Quality: delivering goods and services with consistency and excellence. It is the level of benefits that the customer expects from the product and must be sufficient for the price paid for the product or service.	Reliability/responsiveness Aesthetics/appearance Cleanliness/order Comfort Friendliness Communication Courtesy Competence Access Availability Safety
	Flexibility: response (adaptation) to changes in factors that influence business performance, such as market or customer needs.	Volume flexibility Delivery speed flexibility Specification flexibility
	Resource utilization: how efficiently a company uses its available resources. The company's assets should be used for the appropriate purpose and in the most efficient way possible.	Productivity Efficiency
	Innovation: creating products and new ways of doing things. It encompasses the drive and ability to introduce new ideas, processes or products.	Innovation process performance Performance of individual innovations

*Because the results obtained are a function of past organizational performance in relation to certain factors.

Source: adapted from Fitzgerald *et al.* (1991).

3.1.3 Balanced Scorecard (BSC)

Created in 1992 by American electrical engineers David P. Norton and Robert S. Kaplan, based on their experience in business and accounting, the Balanced Scorecard (BSC) is an expansion of the KPI concept beyond financial measures, which tell the story of past events and were

sufficient for companies in the industrial age (1760-1840). By including a set of non-financial measures, which are more appropriate for companies in the information age (second half of the 20th century to the present day), the BSC allows organizations to seek to create future value through investments in customers, suppliers, employees, processes, technology and innovation (Balanced Scorecard Institute, 2025).

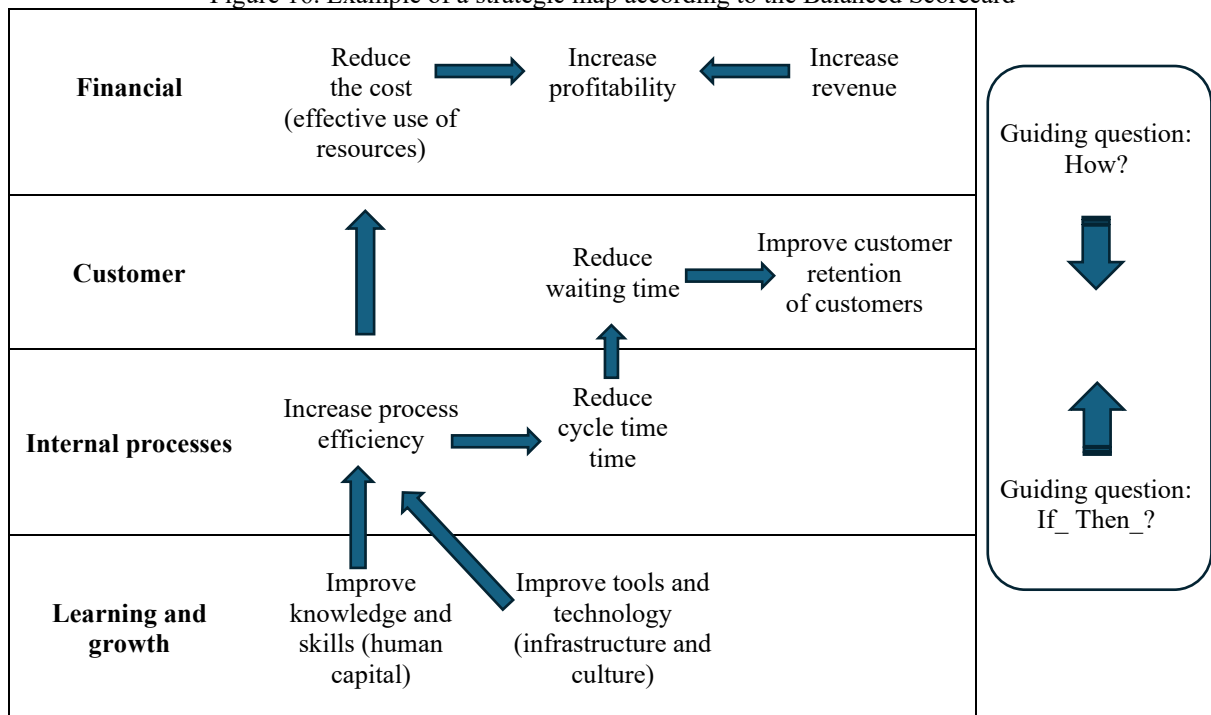
The strategic map is an element derived from the application of the BSC methodology and consists of a simple graph that shows a logical cause-and-effect connection between the organization's strategic objectives from four perspectives (Martins, 1998; Silveira, 2007):

- **Financial:** it summarizes the consequences of actions already taken in an economic way. It must be in line with the organization's strategy, with the goal of producing the desired long-term economic performance. Each performance measure in this dimension is part of a cause-and-effect relationship and typically related to profitability, such as operating revenue, return on capital employed, economic value added, etc.;
- **Customer:** it measures the results for the market segments and respective customers arising from the strategy, which represent the sources that will produce the revenue component of the organization's financial objectives. The essence for the organization to remain in the market is to serve (satisfy) the consumer. The main performance measures from this perspective are customer satisfaction, customer retention, new customer acquisition, profitability per customer, etc.;
- **Internal processes:** it contains measures and objectives for the processes that the organization needs to excel at to deliver value to customers and satisfy shareholders. It lists the critical points throughout the organization's internal value chain. Each organization has a set of specific processes according to the market in which it operates, but it is unanimous that processes whose performance has a major impact on customer satisfaction are a priority. Internal processes are subdivided into: (i) Innovation Processes: they identify new markets and devise product or service offerings; (ii) Operations Processes: they generate products or services and deliver them to customers; and (iii) After-Sales Service Processes: they provide services such as warranties, technical assistance, returns, etc.

- **Learning and growth (or organizational capacity):** it seeks to identify where the organization needs to excel to achieve a significant breakthrough in performance. There are three sources for organizational learning and growth: people, systems and organizational procedures. The focus is on seeking to decentralize power (empowerment) and improve employee capacity, information systems, information alignment and motivation. The main categories are employee capacity, information system capacity, motivation, empowerment and alignment.

According to the Balanced Scorecard Institute (2025), a strategic objective is understood as the breakdown of abstract concepts, such as vision and mission, into actions to be implemented daily with a view to continuous improvement. An example of a strategic map can be seen in Figure 16, in which the strategic objectives are shown in the rectangle.

Figure 16. Example of a strategic map according to the Balanced Scorecard



Source: adapted from Balanced Scorecard Institute (2025).

For each objective of the strategic map, there will be at least one KPI that will be identified and monitored in terms of the degree of implementation and effectiveness of the organization's strategies. In other words, the KPIs will indicate the operational gap between actual performance and expected performance.

The scope for applying the BSC should be cascading, i.e., the BSC should be translated to the first business units (called Level 1), to support units or departments (Level 2), and then to teams or individuals (Level 3), with responsibility defined at each level. This alignment makes objectives and performance metrics more tactical and operational (Balanced Scorecard Institute, 2025).

3.1.4 Sink & Tuttle Model

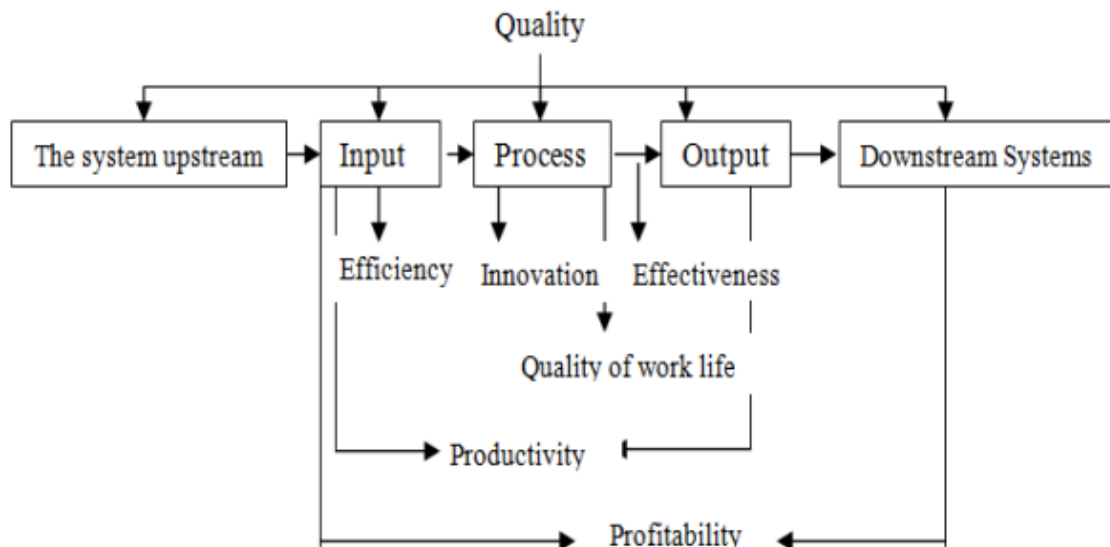
Engineer D. Scott Sink and organizational psychologist Thomas C. Tuttle, in their book "Planning and Measurement for Performance", published in 1993, argue that a PMS needs to be integrated into the organization's management system and focused on continuous improvement. It should be an appropriate combination of qualitative and quantitative, subjective and objective, intuitive and explicit, physical and logical, known and unknown methods, which provide synergy between these variables.

In this sense, Sink & Tuttle (1993) present a set of seven performance criteria, described below and outlined in Figure 17, against which an organizational system should be measured (Vargas *et al.*, 2011):

- **Effectiveness:** the ratio of results obtained to planned results (linked to results and “doing the right things”). It is the effective performance of a certain activity, on time and with the specified quality requirements.
- **Efficiency:** the ratio of planned resources to resources used (linked to “doing things right”).
- **Quality:** its definition and measurement involve the use of at least five verification points: (i) selection and management of suppliers; (ii) confirmation that the organizational system is receiving what it requested; (iii) creation of quality in the product or service in the transformation process; (iv) verification that what is being generated by the system meets specifications; and (v) evaluation of how customers are reacting to the delivery of the product or service.

- **Productivity:** the relationship between what is generated by a system (outputs or results obtained) and what enters a system (inputs or resources used) during a certain period. Inputs can be human resources, capital, energy, materials, etc.
- **Quality of working life:** the response or emotional reaction of people in the organizational system to certain factors such as remuneration, feedback, autonomy, task significance, degree of involvement in planning, relationships with colleagues, culture, working conditions, etc.
- **Innovation:** the creative process of successfully changing what is necessary to survive, compete, grow and achieve desired results.
- **Profitability:** the set of measures that relate revenue to costs.

Figure 17. The organizational system and operational definitions of the seven performance criteria



Source: Sink & Tuttle (1993).

3.1.5 Skandia Intellectual Capital Navigator

Intellectual capital models present a view of organizations' intangible assets as important factors for business success and competitiveness. This concept was popularized in the late 1990s by several authors, such as Thomas A. Stewart, with the publication of the book "Intellectual Capital: The New Wealth of Organizations"; Swedish professors Leif Edvinsson and German-American Michael S. Malone, with the book "Intellectual Capital: Discovering the Real Value

of Your Company by Identifying Its Internal Values", and Finnish theorist Karl Erik Sveiby with the book "The New Wealth of Organizations: Managing and Evaluating Knowledge Assets".

According to Stewart (1998), the intellectual capital model ensures that an organization has a significant capacity for learning and, thus, the development of its growth potential. For this author, intellectual capital is formed by the exchange between human capital (knowledge carried by the individual, inalienable), structural capital (change of ownership of knowledge from the individual sphere to the organizational sphere), and customer or brand capital (image of the organization in society, in the market).

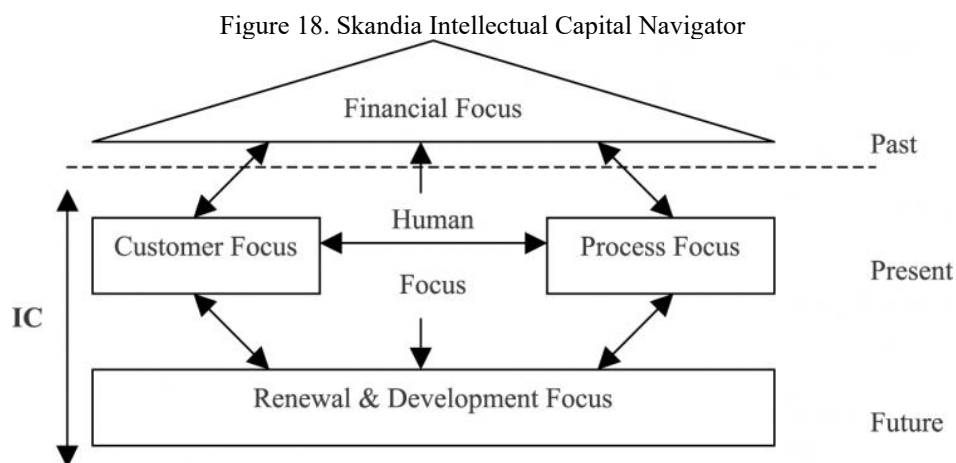
Sveiby's (1998) model for measuring intellectual capital is based on dividing the items that make up intellectual capital into tangible indicators and intangible resources, with intangibles being subdivided into individual competence (employee knowledge, skills and experience), internal structure (processes, systems, culture and patents), and external structure (customers, suppliers and partners). For this author, the difficulty managers face in developing a company's assets arises when the most valuable assets are intangible resources, rather than material objects that can be accounted for in the balance sheet.

For Edvinsson & Malone (1998), intellectual capital is divided into three forms (Wagner, 2006):

- Human capital: knowledge, experience, innovative power, and the ability and skills of employees to perform day-to-day tasks, also considering the culture and philosophy of the organization, as well as organizational creativity and innovation;
- Structural capital: framework, empowerment, infrastructure that support human capital. The quality and scope of computerized systems, the organization's image, databases, patents, trademarks and copyrights are measures of structural capital. Given the wide diversity of components, structural capital has been divided into:
 - Organizational capital: systematized, organized and codified competence of the organization. Investment in means to streamline the flow of knowledge through the organization;

- Innovation capital: capacity for renewal and effects/results of this renewal in the form of legally protected commercial rights, intellectual property and other assets; and
 - Process capital: practical knowledge employed in the continuous creation of value, consisting of processes, technical standards and employee-oriented programs that increase and expand the efficiency of production or service delivery.
- Customer (or relational) capital: measures customer relationships, their strength and longevity.

To show the interaction between these six areas of intellectual capital and locate them on the organization's timeline, the Skandia navigator was created (Figure 18), in reference to the Swedish insurance and financial services company that pioneered the measurement of intellectual capital (Albano, 2008). After surveying the indicators and indices for each dimension, the intellectual capital (IC) equation is calculated, in which a financial value C is multiplied by an efficiency coefficient, represented by i . While C emphasizes commitment to the future, the variable i bases this commitment on current performance (Edvinsson & Malone, 1998; Wagner, 2006; Malavski, Lima and Costa, 2010):



The Skandia navigator was the first model for highlighting and measuring intellectual capital and produces an assessment report with measures organized according to five focuses or dimensions (Edvinsson & Malone, 1998; Wagner, 2006; Malavski, Lima and Costa, 2010):

- **Financial:** a dimension that constitutes the organization's past. Dimension composed of the cataloging of indices and indicators that investigate financial activities, such as revenue/employee, return on net asset value, information technology expenses/administrative expenses, billing/employee, net operating revenue, investments in information technology, etc.;
- **Customer:** a dimension that conveys the idea of total customer service, which is not limited to the moment of sales and is ongoing. Some indicators of this dimension: customer classification, number of customers, cost savings/contract, market share, number of points of sale, idleness index, market coverage, number of days spent visiting customers, etc.;
- **Process:** a dimension that constitutes the present and the activities of the organization. Dimension that represents the role of technology in supporting global value creation. The indicators of this dimension should demonstrate how the organization uses its technologies to create value, such as error-free contracts, administrative expenses/employee, employees' computer skills, third-party payment processing time, cost of information technology equipment purchased less than two years ago/profit increase, cost of replacing information technology equipment discontinued by manufacturers, corporate quality goals, etc.;
- **Renewal and Development:** a dimension that projects the immediate future, establishing what the organization is doing in the present to adequately prepare itself to take advantage of future opportunities. It assesses how the organization prepares and defends itself for possible changes in employees, the economic scenario, the customer base, new markets, infrastructure and strategic partnerships. The indicators that make up this dimension are at the opposite end of the financial dimension, such as percentage of training hours, percentage of development hours, employee satisfaction index, marketing/customer expenses, training/employee expenses, percentage of employees under forty, resources invested in research and development/total investment, etc.; and
- **Human:** a dimension that seeks to assign value to employee behavior, competence and motivation, considering organizational culture and work environment. Examples of indicators for this dimension: number of employees, number of female managers,

employee turnover, average age of employees, leadership index, motivation index, empowerment index, average number of years of service with the company, training time (days/years), etc.

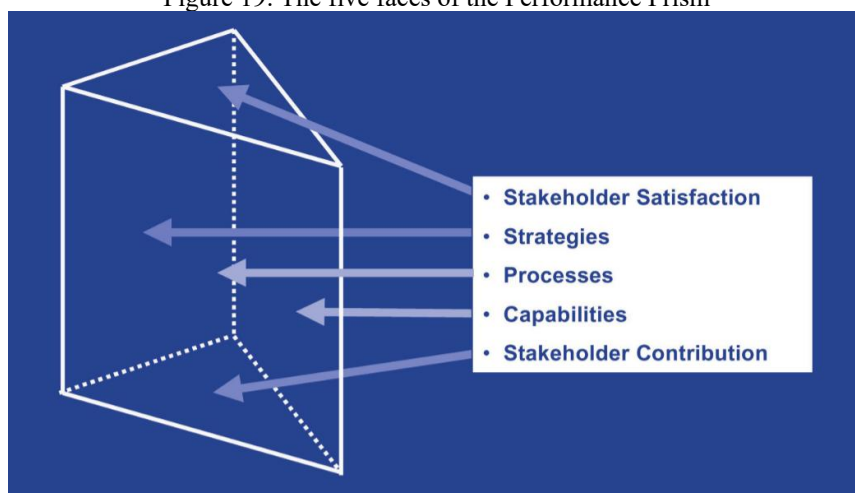
According to Edvinsson & Malone (1998), the intellectual capital management process has four stages: (i) understanding the components of Skandia that demonstrate potential for value creation; (ii) leveraging value through the exchange of ideas; (ii) developing the exchange of skills so that knowledge is disseminated; (iv) capitalizing on the process by disseminating, codifying and recycling the exchange of components.

3.1.6 Performance Prism

Professor Andy Neely and senior researcher Chris Adams developed this model at Cranfield University in England in 2000 to assist in the selection of dimensions for performance evaluation, applicable to both for-profit and non-profit organizations. The idea behind the Performance Prism is to put stakeholders (external focus) at the forefront, while relating them to strategies, processes and capabilities (internal focus).

The performance evaluation criteria are divided into five faces of a prism, representing independent but interconnected perspectives, as shown in Figure 19.

Figure 19. The five faces of the Performance Prism



Source: Neely & Adams (2000).

At the top and bottom of the prism are stakeholder satisfaction and stakeholder contribution, respectively. The three sides of the prism represent strategies, processes and capabilities (Neely, Adams, & Kennerley, 2002; Silveira, 2007):

- **Stakeholder satisfaction:** it identifies who the stakeholders are and what their needs and expectations are in relation to the organization. This includes investors, customers and intermediaries, employees, regulatory bodies, the community and suppliers.
- **Strategies:** this side identifies the organization's strategies that must be put into practice to ensure that the desires and needs of stakeholders are met. This dimension is where it is monitored whether objectives are being met and whether information is provided for executive decisions. It encompasses the organization, business units, brands/products/services and operations.
- **Processes:** this dimension assesses whether the organization has the appropriate processes in place to implement its strategies. It is possible to identify specific performance measures for each of the business processes, verifying their efficiency and effectiveness. It encompasses developing products and services, generating and meeting demand, planning and managing the organization.
- **Capabilities (or competencies):** this dimension verifies whether the organization has the capabilities required to execute its processes. It encompasses the combination of people, practices, technology and infrastructure that, together, enable the execution of processes. Without the right people, the right practices and the right technology and infrastructure, it is impossible to execute or improve processes.
- **Stakeholder contribution:** it defines what the organization expects from stakeholders and assesses their contribution to achieving objectives and whether they are delivering what is desired.

3.1.7 Global Performance Measurement System (SMDG)

A tool proposed by the National Quality Foundation (FNQ), a private, non-profit Brazilian institution created in 1991 that has promoted the National Quality Award (PNQ) annually since

1992. The PNQ represents the highest public recognition of management excellence for organizations based in Brazil.

In Portuguese, SMDG stands for *Sistema de Medição do Desempenho Global*. It uses the seven criteria (or dimensions) of the PNQ as the basis for a systemic management model for organizations seeking excellence in performance (Silveira, 2015):

- **Leadership:** it establishes the organization's values and guidelines, driving the dissemination of a culture of excellence;
- **Strategies and plans:** this dimension guides the organization, its performance and its competitive position. They are listed in short- and long-term action plans, serving as a reference for decision-making and resource allocation;
- **Customers and society:** the reason for the organization's existence and, therefore, their needs and desires must be met effectively and with quality, creating value and retaining them within the organization;
- **Information and knowledge:** this dimension represents organizational intelligence, which enables the organization to perform critical analysis and make the necessary decisions at all levels;
- **People:** they make up the workforce. They must be trained and satisfied with their position and with the work they do. Besides, the environment must be conducive to consolidating a culture of excellence to execute processes;
- **Processes:** the identification of the best ways to use and capture the resources to be used in the production of goods and services, to create value for customers and to contribute to the development of society; and
- **Organizational results:** this dimension monitors organizational performance and trends in relation to stakeholders.

3.1.8 Comparison of the PMSs presented

To conclude the section on PMSs, Chart 9 below presents a comparison of the models presented here.

Chart 9. Comparison of the performance measurement models presented

Model / Author(s) / Year	Advantages	Disadvantages	Characteristics
Results and Determinants Framework / Fitzgerald <i>et al.</i> / 1991	Specifies, in reasonable detail, what the indicators should be like.	<ul style="list-style-type: none"> - Does not include customers or human resources as performance dimensions; - Does not provide a truly balanced view of performance; - It is complicated to understand and use; and - Does not present an explicit process for developing the model. 	The six dimensions serve as pillars or core elements by which performance is measured. They represent both current operational parameters and future predictors of success.
Balanced Scorecard (BSC) / Kaplan & Norton / 1992	<ul style="list-style-type: none"> - Easily identifiable perspectives; - Establishes cause-and-effect relationships between strategic objectives for each perspective; - Consistent literature; - Focus on objectives; - Strategic map; and - Multidisciplinary and cross-functional performance measurement at different hierarchical levels. 	<ul style="list-style-type: none"> - Does not adequately integrate strategy and operations; - Does not correctly consider human knowledge; - Not suitable for benchmarking; - Designed to serve as a control tool rather than a tool for continuous improvement; and - Intended for senior and middle management. 	It is interesting for for-profit companies with a certain degree of management complexity. Its application is relatively complex.
Sink & Tuttle Model / 1993	<ul style="list-style-type: none"> - Definition of some concepts; and - Incorporation of criteria beyond financial ones. 	It can lead to the definition of excessive indicators when considering seven performance criteria.	It may be more suitable for complex organizations with available resources.
Intellectual Capital Navigator Skandia / Edvinsson & Malone / 1998	<ul style="list-style-type: none"> - Flexible; - Dynamic; and - Suitable for benchmarking purposes. 	<ul style="list-style-type: none"> - Too much focus on knowledge assets, neglecting others; - Confusing literature: variety of approaches and definitions; and - Lack of standardization in measuring intellectual capital. 	It considers the intellectual capacity of employees to be an important factor in the success of the company. It can be applied to non-profit companies.

Model / Author(s) / Year	Advantages	Disadvantages	Characteristics
Performance Prism / Neely & Adams / 2000	<ul style="list-style-type: none"> - Links the company's strategy and operations; and - Provides a system for measuring strategic performance. 	<ul style="list-style-type: none"> - Does not provide rationale for its implementation, nor examples of performance indicators; - The development of operational performance measures is seen as an optional process; and - Does nothing to ensure continuous improvement in the organization that uses it. 	The only model that recognizes the reciprocal relationship between stakeholders and the organization through the "stakeholder contribution" facet. Ideal model for large supply chains.
Global Performance Measurement System (SMDG) / National Quality Foundation (FNQ) / 2002	<ul style="list-style-type: none"> - Uses mechanisms for critical analysis of overall performance; - Encourages learning; - Uses multiple performance dimensions; - Identifies cause-and-effect relationships; - Provides a comprehensive view of how to optimize organizational performance; and - Seeks alignment with strategy and organizational structure. 	<ul style="list-style-type: none"> - Lack of clarity on how relevant information was made available when needed; - Lack of a mechanism for adapting to changes in the external and internal environment; and - It is more of a diagnostic tool than a PMS per se. 	It reflects the experience, knowledge and research work of organizations and experts in Brazil. It uses the seven criteria of the National Quality Award (PNQ).

Source: author, adapted from Albano (2008, p. 48), Godoy *et al.* (2016, pp. 41 and 43), Silva (2023, pp. 24, 26, 30, and 31), and Sobreira Netto (2007, pp. 8 and 10).

Chart 10 presents a compilation of the dimensions common to the performance measurement models presented and their respective definitions. The division of a PMS into dimensions is necessary to clarify priority areas and ensure balance between these areas (FNQ, 2012). “The indicator and the dimension of interest are not to be confused (...). There are even cases in which the indicator is chosen first and then associated with a dilemma (...), especially for multidimensional concepts such as human development and quality of life” (Brazil, 2012, p. 27).

It should be noted that the “processes” dimension is common to all six PMSs presented. The “financial” dimension does not appear only in the Performance Prism, and the “organizational capacity” dimension does not appear only in the Sink & Tuttle model. On the other hand, there are dimensions that appear only in one PMS: “flexibility,” only in the Results and Determinants Framework; “productivity,” in the Sink & Tuttle model; “leadership,” in the SMDG; and “stakeholder contribution,” in the Performance Prism.

Chart 10. Compilation of dimensions common to the performance measurement models presented

Dimensions	PMS						Definitions
	Results and Determinants	BSC	Sink & Tuttle	Skandia	Prism	SMDG	
Finance	x	x	x	x		x	Overview of the organization's financial health and profitability. It must be aligned with the strategy.
Stakeholder satisfaction		x		x	x	x	Investors, customers and intermediaries, employees, regulatory bodies, society and suppliers, and what their needs and expectations are in relation to the organization.
Flexibility	x						Response (adaptation) to changes in factors that influence the organization's performance, such as market or customer needs.
Productivity			x				The ratio of what is generated by a system to what enters a system (human resources, capital, energy, materials) during a certain period.
Quality	x		x				Delivering goods and services with consistency and excellence. It is the level of benefits that the customer expects from the product.
Efficiency	x		x				Ratio of planned resources to resources used (linked to "doing things right").
Process	x	x	x	x	x	x	How organizational resources are used to implement strategies, pursue innovation, create and deliver value to stakeholders, and contribute to society.
Organizational capacity	x	x		x	x	x	A combination of people, practices, technology and infrastructure that, together, enable the execution of processes and adequately prepare the organization for future opportunities.
Effectiveness			x			x	The ratio of actual results to planned results (linked to "doing the right things").
Human			x	x		x	People who make up the workforce and their response or emotional reaction to their position, activities, organizational culture and work environment.
Strategies					x	x	Direct and control the organization, its performance and its competitive position for decision-making and resource allocation.
Leadership						x	Establishes the organization's values and guidelines, driving the dissemination of its culture.
Contribution of stakeholders					x		What the organization expects from stakeholders; what contribution stakeholders make to achieving objectives.

Source: author.

As the objective of the thesis is to structure a PMS for entrepreneurial universities, the following section will explore the dimensions, factors and characteristics that entrepreneurship encounters in higher education, as a result of the Systematic Literature Review.

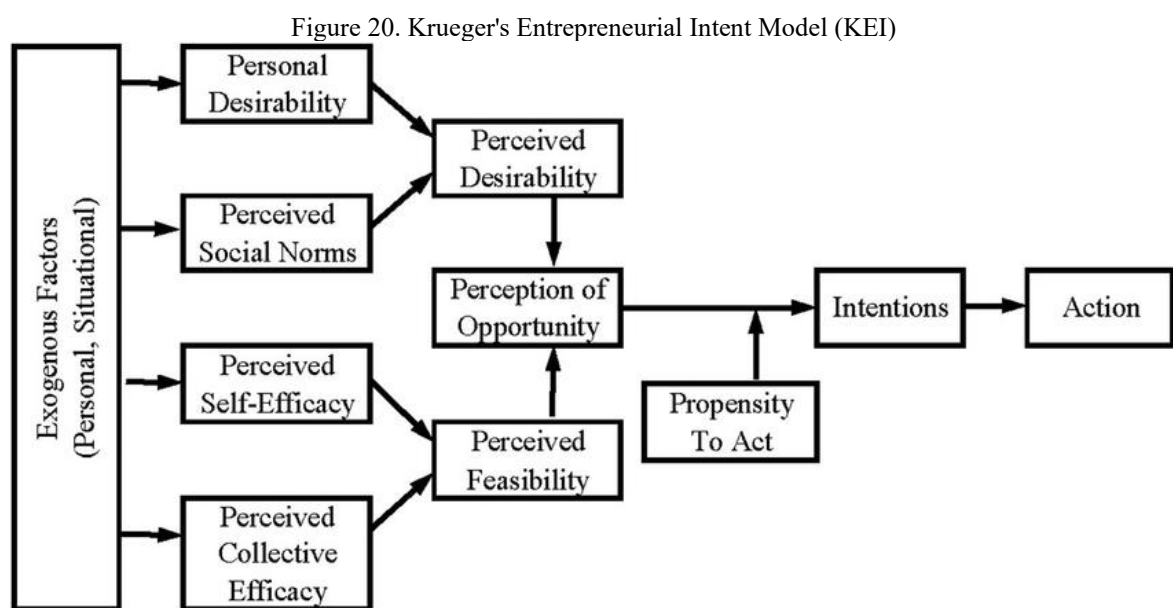
3.2 ACADEMIC ENTREPRENEURSHIP

Entrepreneurship can be defined as any attempt by an individual, a team or an established business to create a new venture, which may include self-employment, new businesses or the

expansion of existing businesses. Entrepreneurial activity begins even before the business is formalized (GEM, 2025).

Entrepreneurship is more than owning or starting a business; it is the process by which individuals identify opportunities, allocate resources and create value (Akinyoade, Dietz and Uche, 2017). It is also understood as the act of creating innovation and financing it to transform such innovations into economic goods (Stafford & Hartman, 2014). Therefore, an entrepreneur is someone who sees problems as opportunities and takes the necessary steps to solve them (Baliyan, Mosia and Baliyan, 2020).

To identify the intention to start an entrepreneurial venture, American educator Norris Krueger developed a model of entrepreneurial intention (KEI, from the acronym for Krueger Entrepreneurial Intention model, presented in Figure 20).



Source: Krueger (2009).

This model considers the Theory of Planned Behavior (TPB) by Polish social psychologist Icek Ajzen, as well as the Shapero's Entrepreneurial Event model (SEE) by researcher Albert Shapero. The KEI model proposes that the development of entrepreneurial intentions sufficient for the action of starting an entrepreneurial event derives from the five critical antecedents listed below, in addition to a motivating event that triggers the disruption in behavior (Farrell *et al.*, 2024):

- I. The individual's personal belief about how desirable or undesirable the results are (personal desirability);
- II. The normative beliefs perceived in their peer group and the individual's motive to comply with those beliefs (perceived social norms);
- III. The individual's perception of having the necessary skills and self-confidence to perform the task (perceived self-efficacy);
- IV. When other members are needed to support the entrepreneurial event, the group's shared belief in their ability to organize and execute the actions necessary to perform the task (perceived collective efficacy); and
- V. The individual's ability to independently execute an action plan and act on newly identified opportunities (propensity to act).

Therefore, entrepreneurship is a multifaceted endeavor that is influenced by demographic, social, cultural, economic and environmental factors (Arranz, Arroyabe and Fdez. De Arroyabe, 2019).

Baliyan, Mosia and Baliyan (2020) analyzed 149 students in their final year of agriculture courses at the University of Agriculture and Natural Resources in Botswana and found that gender, family income, level of education and parents' profession, for example, can be determining factors in entrepreneurial intention. Therefore, entrepreneurial attitudes vary from one individual to another depending on the factors that influence their career, whether these come from past experiences or persuasive external communication.

Facilitators include employability, income generation and improved socioeconomic growth. Among the main constraints to entrepreneurship are the lack of adequate infrastructure and lack of capital, which were significant predictors of entrepreneurial attitudes in the sample of graduates studied – in which women had more positive attitudes toward entrepreneurship than men (Baliyan, Mosia and Baliyan, 2020).

Ozaralli & Rivenburgh (2016) state that entrepreneurship is a complex cognitive process that involves not only considerable human and material resources, but also significant risks. The personal factor that is considered the most critical and influential in entrepreneurial intentions is self-efficacy (Huang *et al.*, 2022; Rodríguez Gutiérrez *et al.*, 2021). For Yeh *et al.* (2021), it is a determinant of an individual's approach to unfamiliar and challenging situations, such that,

despite the obstacles, those with higher levels of self-efficacy tend to have better expectations of results and are more inclined to identify and seize opportunities.

Al Amimi & Ahmad (2023) cite that most of the literature on entrepreneurship focuses on traditional entrepreneurship, "which includes starting a business with a physical storefront to offer goods and services to the community" (Gul, 2020). However, due to the technological disruption brought about by the Fourth Industrial Revolution, research should move toward digital entrepreneurship (Zaheer *et al.*, 2019).

The Global Entrepreneurship Monitor (GEM) is the world's leading research dedicated to understanding the role of entrepreneurship in global economic and social development based on its own models. Launched in 1999, the study is conducted annually and has involved more than 100 countries over the years. The conditions identified by GEM that favor or hinder the creation of new businesses in a given economy are presented in Chart 11.

Chart 11. Framework of Entrepreneurial Conditions

A1. Entrepreneurial Financing: Are there sufficient funds for new startups?
A2. Ease of Access to Entrepreneurial Finance: Are these funds easily accessible?
B1. Government Policy – Support and Relevance: Does the government promote and support startups?
B2. Government Policy – Taxes and Bureaucracy: Are new businesses overburdened?
C. Government Entrepreneurship Programs: Are there quality support programs available?
D1. Entrepreneurial Education in Schools: Do schools introduce ideas of entrepreneurship?
D2. Post-School Entrepreneurial Education: Do HEIs offer courses on how to start a business?
E. Research and Development Transfer: Can research be transformed into new businesses?
F. Commercial and Professional Infrastructure: Is this infrastructure sufficient and accessible?
G1. Ease of Entry – Market Dynamics: Are markets free, open and growing?
G2. Ease of Entry – Barriers and Regulation: Do regulations encourage or restrict entry?
H. Physical Infrastructure: Is this infrastructure sufficient and accessible?
I. Social and Cultural Norms: Does the culture encourage and celebrate entrepreneurship?

Source: GEM (2025).

In addition, GEM differentiates entrepreneurs into groups, namely (GEM Brazil, 2025):

- Potential Entrepreneurship – Potential Entrepreneurs: proportion of the population that, in the last twelve months, are not yet entrepreneurs but intend to start a new business in the next three years;

- Early-Stage Entrepreneurship:
 - Emerging/Nascent Entrepreneurs: proportion of the population involved, in the last twelve months, in ventures in the start-up phase or already in operation and remunerating their partners or employees for a maximum of three months;
 - New Entrepreneurs: proportion of the population that is both the owner and manager of a business that has been operating for at least three months and at most three and a half years; or
- Established Entrepreneurship – Established Entrepreneurs: proportion of the population involved in businesses that have been in existence for more than three and a half years.

The most recent edition of GEM took place in 2024 in 51 countries and interviewed, in each economy, 2,000 adults aged 18 to 64 – representing the population in which entrepreneurs are found – and 58 entrepreneurship experts – selected to assess the conditions offered by the country for the development of this activity. In total, more than 150,000 people were surveyed for that year's global report (GEM, 2025).

The data presented in Table 2 comes from the 2024 Executive Report for Brazil, which has participated in the project since 2000 and, since 2001, has been supported by the Brazilian Micro and Small Business Support Service (Sebrae). Since 2022, still with the collaboration of Sebrae, the study has been conducted in the country by the National Association for Entrepreneurship and Small Business Management Studies (Anegepe). In 2024, about 33% of the Brazilian adult population was involved in some stage of entrepreneurial activity (47 million people), and almost half of the adult population that is not entrepreneurial intended to have their own business in the next three years (GEM Brazil, 2025).

Also based on data collected by GEM in Brazil in 2024, Figure 21 shows the four main reasons mentioned by Brazilian entrepreneurs for starting a business. It can be observed that one of the most notable findings was the record proportion of people who responded “to build great wealth or a very high income” (69.3%), while “to earn a living because jobs are scarce” recorded the lowest proportion in its historical series in 2024. This shows that the entrepreneurial dynamic in Brazil has changed in recent years, with unemployment losing strength and the desire to be an entrepreneur (to make a difference and earn more) gaining strength in the motivational framework (GEM Brazil, 2025).

Table 2. Specific rates¹ and variations² (in percentage), between 2023 and 2024, of early-stage and established entrepreneurs according to sociodemographic characteristics – Brazil

Socio-demographic characteristics	Rates in 2024		2024/2023 variations (in %)	
	Early-stage entrepreneurs	Established entrepreneurs	Early-stage entrepreneurs	Established entrepreneurs
General Rate	20.3	13.2	9%	11%
Gender				
Male	22.3	16.8	-2%	6%
Female	18.4	9.8	26%	22%
Age group				
18 to 24	16.0	3.0	-22%	9%
25 to 34	25.1	9.8	10%	0%
35 to 44	25.6	15.2	23%	9%
45 to 54	14.6	17.9	-12%	22%
55 to 64	16.7	19.5	77%	10%
Education³				
Incomplete elementary education	15.1	18.9	27%	42%
Complete elementary education	24.8	13.1	52%	-9%
Complete high school education	20.7	11.9	7%	18%
Complete higher education or higher	20.2	13.7	-10%	4%
Household income				
Up to 1 minimum wage	16.9	7.7	48%	12%
More than 1 to 2 minimum wages	19.9	8.7	7%	-3%
More than 2 to 3 minimum wages	20.5	12.7	12%	4%
More than 3 to 6 minimum wages	27.5	15.1	17%	-8%
More than 6 minimum wages	24.2	26.8	-19%	27%
Ethnicity				
White	19.1	15.3	6%	13%
Black or brown	20.9	11.5	10%	6%

¹ Percentage of the population referring to each category of the population (e.g., 8.5% of the female population in Brazil are emerging/nascent entrepreneurs).

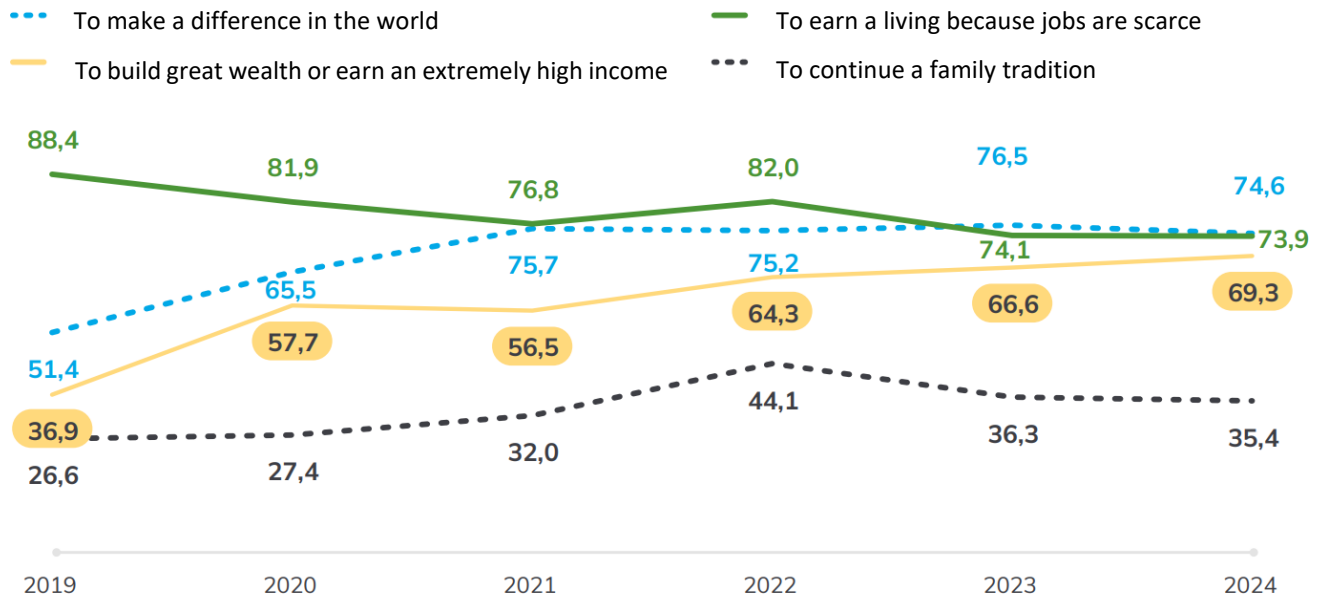
² Percentage variation in the entrepreneurship rate in each population category (e.g., between 2023 and 2024, there was a 40% increase in the nascent entrepreneurship rate among women in Brazil).

³ Incomplete elementary education = No formal education and incomplete elementary education; Complete elementary education = Complete elementary education and incomplete high school education; Complete high school education = Complete high school education and incomplete higher education; Complete higher education or higher = Complete higher education, incomplete and complete specialization, incomplete and complete master's degree, incomplete and complete doctorate.

Source: adapted from GEM Brazil (2025, p. 10).

Figure 21. Evolution of the percentage of early-stage entrepreneurs* according to their motivations for starting a new business

* Who agree totally or partially with the motivation presented.



Source: adapted from GEM Brazil (2025, p. 16).

3.2.1 Entrepreneurial Universities

Although the subject aroused the interest of researchers in the 1980s, the term “entrepreneurial universities” was coined in 1998 by American professor and social scientist Henry Etzkowitz. For him, just as universities educate individual students and send them out into the world, entrepreneurial universities are natural incubators, providing support structures for professors and students to start new intellectual, commercial and joint ventures, and considering new sources of funding such as patents, contract research and partnerships with private companies (Etzkowitz, 2003).

Another prominent thinker on the subject was American sociologist Burton R. Clark, one of the first to study higher education from a global perspective and considered the founder of modern sociology of higher education – which examines how HEIs shape society and how society, in turn, influences these institutions. For him, an entrepreneurial university seeks to make a substantial change in its organizational character to achieve a more promising position for the future. Entrepreneurial universities seek to become stand-up universities, which are significant players in their own right (Clark, 1998).

Entrepreneurial universities are a phenomenon resulting from the transition of the university from a conservator of knowledge to a creator of knowledge (Farrell *et al.*, 2024). However, they are not restricted to innovation and entrepreneurship but also include direct and indirect academic engagement with their immediate environment, with actions such as scientific communication and policy development, which demonstrate social responsibility to their community (Philpott *et al.*, 2011).

Knowledge Spillover Theory highlights that the knowledge created by universities can indirectly spill over into the economy to be exploited by entrepreneurs. This dissemination of university knowledge is key to the role of these institutions within the triple helix – a collaborative innovation model/field that brings together universities (academic corporations), government (the state) and industry (companies, the market) (Fuller, Beynon and Pickernell, 2019). According to Oliveira (2014, p. 70), “the university plays a greater role in industrial innovation within national and regional innovation systems when its performance is interpreted based on the triple helix model”.

Mineiro (2019) also cites the concept of the quadruple helix, in which civil society, media and culture, innovation users, non-governmental organizations and professional associations are also included as actors of innovation; and the quintuple helix, which can be seen as a transdisciplinary structure that analyzes sustainable development and social ecology.

A university is called entrepreneurial when, in addition to its traditional teaching and research missions (Fuller & Pickernell, 2018), it “embraces its role within the triple helix model and adopts the third mission of contributing to regional/national development” (Philpott *et al.*, 2011).

The third mission of universities concerns their interactions with the rest of society, and third mission activities are those primarily driven by the generation, use, application and exploitation – outside academic settings – of the university’s knowledge and other capabilities (Molas-Gallart *et al.*, 2002). Such activities inherent to the third mission are also known as knowledge transfer activities or entrepreneurial activities (Fuller & Pickernell, 2018).

Fernández *et al.* (2018) also cite social responsibility as a fourth mission of universities, equally seen as an extension of the two core missions of teaching and research.

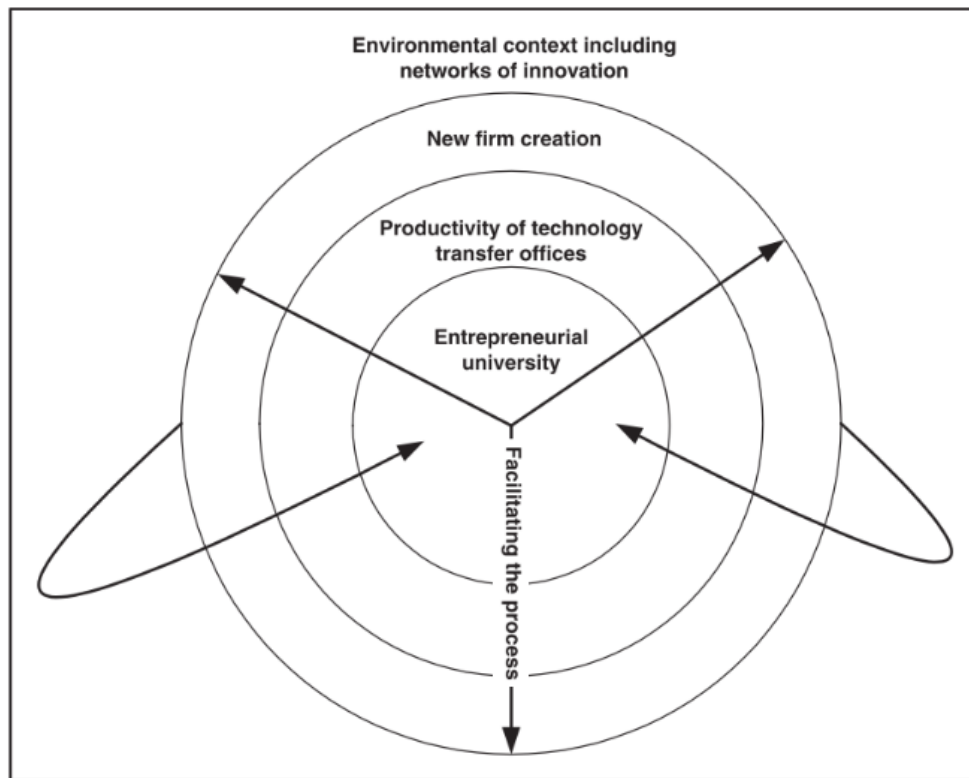
Academics as entrepreneurs are the main actors in achieving the third mission of the university (Llorente-Portillo *et al.*, 2024), which is why academic entrepreneurship has been considered an intellectual initiative in which universities cooperate with society in general for economic and social value (Beckman & Cherwitz, 2009).

Academic entrepreneurship can be analyzed at three levels: at the systemic level, where the relationship between universities, companies and government is the driving force behind the entrepreneurial process; at the university level, with the generation of knowledge directed at opportunities and needs in society; and at the individual level, where the learning capacity and personal characteristics of students, teachers and technical staff at HEIs add to the university culture, allowing entrepreneurial activities to emerge (Oliveira, 2014). This is an integrative view, in which academic entrepreneurship encompasses organizational creation, innovation and strategic renewal that occur inside and outside the university (O'Shea *et al.*, 2004).

Seeking to understand this, Rothaermel, Agung and Jiang (2007) conducted a systematic review of 173 articles published between 1981 and 2005 and proposed a conceptual framework for university entrepreneurship. Figure 22 captures the connections between the four main streams of research on university entrepreneurship identified and the trends within each stream over those decades: (i) entrepreneurial university, (ii) productivity of technology transfer offices, (iii) creation of new companies, and (iv) environmental context including networks of innovation. The integration and interaction between these streams reflect the dynamic and evolving process of the university innovation system.

The cultural and structural adaptation of universities is necessary to adapt to the demands of the market and society, with a focus on innovation, flexibility and cooperation (Pupp & Filep, 2021). According to Oliveira (2014), by becoming entrepreneurial, the university explores opportunities that will generate transferable technologies and bring economic returns. Commercialization activities, by allowing diverse sources of funding, enable universities to increase their innovation and profitability (Karlsdottir *et al.*, 2023), and are a natural step in the evolution of a university system that emphasizes regional and national economic development (Rothaermel, Agung and Jiang, 2007).

Figure 22. Conceptual structure of university entrepreneurship



Source: Rothaermel, Agung, and Jiang (2007, p. 707).

Therefore, Garbutt *et al.* (2019) state that a necessary competency for entrepreneurial universities is to have knowledge of funding sources and how to apply for them, and that lack of funding can represent a formal institutional barrier capable of deterring academics from pursuing identified opportunities (Davey, 2016). For Dvoretzkaya *et al.* (2023), an entrepreneurial university is one that seeks to achieve the greatest possible financial autonomy from the state and effectiveness in its educational and scientific activities, while striving to reduce risks. A key feature, therefore, is the portion of its revenue that comes from non-governmental sources.

The production, exchange and use of knowledge can be linked to four different target audiences: the scientific community (impact on knowledge), civil society (impact on culture), actors with an entrepreneurial orientation (economic impact) and government decision-makers (impact on well-being). In this sense, the structure in Chart 12 classifies knowledge valorization activities.

Chart 12. Structure for broad societal impact of knowledge with examples of knowledge production, exchange and use in each domain

	Academic orientation with impact on knowledge	Civil society orientation with impact on culture	Entrepreneurial orientation with impact on the economy	Government orientation with impact on well-being
Knowledge production	Scientific publications	Lay publications	Patents, products	Development of guidelines, professional publications
Knowledge exchange	Lectures, scientific consultations	Speeches, courses for the general public	Consulting, contract research	Membership in professional associations, participation in policy research
Use of knowledge	Quotations	Use of books (school)	Use of patents and products	Use of guidelines, implementation of recommendations

Source: adapted from Hakala & Ylijoki (2001), Mostert *et al.* (2010) and van Ark & Klasen (2007).

Knowledge valorization activities can be divided into scalable and non-scalable. Scalable activities have formal regulation and more frequent payments into personal accounts (examples: patents, products). Non-scalable activities have wider percentage ranges, informal regulation, and more restrictions, such as time and revenue caps (examples: consulting, contracted education) (van De Burgwal, Dias and Claassen, 2019).

Farrell *et al.* (2024) identified that collaboration with industry (external partners and institutions) is a more relevant path for academic entrepreneurship in middle- and low-income countries, compared to high-income countries, where intellectual property licensing and royalties are the main activities. In addition, the authors called “mitigators of activation of academic entrepreneurship” the three groups of factors that hinder the transition from intention to entrepreneurial action in universities in middle- and low-income countries:

- I. Ecosystem: academics can only engage with society and be entrepreneurs if the system in which they operate supports this approach. Entrepreneurial anxiety is an emotional response caused by a person's cognitive assessments of potential threats to pursuing entrepreneurial behavior, mainly due to the lack of an adequate entrepreneurial ecosystem. Weak entrepreneurial ecosystems increase the complexity of the notion of an entrepreneurial university, which requires a holistic macro response that reconsiders labor market policies, financial market and regulation, competition policy, trade regimes and others. Without this, independent

initiatives at the micro (university) level will be fruitless (Ukil, 2022; Fischer *et al.*, 2019).

- II. University organizational structure: as universities move toward greater business orientation, it is essential to consider the organizational structure needed to support this aspiration. Management support has been shown to be a crucial element in creating an organizational environment that promotes innovation and entrepreneurship. A dynamic, rather than static, environment legitimizes the entrepreneurial pursuit of academics, as their perception of entrepreneurial orientation within their institution influences their involvement in certain activities (Moraes *et al.*, 2023; Guo *et al.*, 2019; Kalar & Antoncic, 2015).
- III. Debilitating environmental factors: serious crimes, challenges to academic independence, lack of human resources, poor or non-existent infrastructure and political instability are barriers to the activation of entrepreneurship (Farrell *et al.*, 2024).

In the view of O'Shea *et al.* (2004), the current competitive position of many regional economies has been radically transformed precisely because of the relationship between university research and innovation in the private sector, the evolution of technology transfer activities (mediated by technology transfer offices), and the creation of new companies to exploit the technology and knowledge generated at the university: spin-offs and spin-outs (the difference being that here the universities retain majority control). Although startups may have licensed technologies/products, they do not involve the participation of universities, and the term is commonly used to refer to any type of company generated at the university with or without participation (Oliveira, 2014).

This has been made possible by the creation of innovation parks and science centers, which are seen as catalysts for the knowledge-based economy and, together with entrepreneurial strategies, strengthen the role of universities as economic agents (Pupp & Filep, 2021). Science and technology parks are strategic instruments for connecting universities to the productive sector, and there are different management strategies that influence regional impact, as shown in Figure 23:

Figure 23. University research park strategies

Specialization	high	Matchmaker - Specific focus on sector/industry in tenant selection; - Low level of innovation ecosystem services; - Higher risk of underutilized infrastructure; - Lower risk arising from maintaining expensive development services.	Gardener - Specific focus on the sector/industry when selecting tenants; - High level of innovation ecosystem services; - Higher risk of underutilized infrastructure; - Higher risk arising from the maintenance of expensive development services; - Greater potential to contribute to the development of the local knowledge economy.
	low	Owner - Unfocused sectoral/industrial policy; - Low level of innovation ecosystem services; - Lower risk of underutilized infrastructure; - Lower risk from maintaining expensive development services; - Less efficient use of resources.	Trainer - Unfocused sectoral/industrial policy; - High level of innovation ecosystem services; - Lower risk of underutilized infrastructure; - Lower risk arising from maintaining expensive development services; - Greater potential to nurture new sectors and potential innovators.
		low level	high level

Development services

Source: adapted from McCarthy *et al.* (2018).

Karlsdottir *et al.* (2023) argue that gaining a better understanding of third mission activities does not facilitate the creation of an entrepreneurial university structure but rather assists in “building a powerful and dynamic research environment in regional innovation systems through the deliberate allocation of funds, the creation of appropriate organizational structures and incentives, and the development of policies”. The authors present five components (or dependent variables) of the third mission:

- I. Community activities: collaborative activities with educational institutions and other public institutions, including volunteer work for the benefit of the community. Examples: voluntary contribution to the community; organization of conferences and workshops; contribution to public policy; lectures, public debates or talks for non-academic organizations;
- II. Scientific communication: items of public communication of science, often called popular science communication. In academia, it is considered less prestigious than peer-reviewed content, but appearances in the media generally reach a larger audience. Examples: interviews for online media; TV and radio programs; podcasts; writing articles for newspapers;

- III. External training and teaching: activities such as training and mentoring at work, and teaching outside academia. Examples: joint courses or teaching programs with industry or public organizations; participation in lifelong learning activities;
- IV. Applied research: activities related to funding and participation in formal research and development collaborations. Examples: joint funding applications with industry/public organizations; formal research and development collaborations, such as contract research or joint research projects; and
- V. Commercialization: publication of patents or patent applications as co-inventor or applicant; licensing; participation in or initiation of the creation of a cluster or development of a Science Park or Technology Transfer Office; creation of or participation in the creation of a spin-off or startup.

The work of Karlsdottir *et al.* (2023) investigated how individual and organizational factors influence the propensity of academics to engage in third mission activities in the context of Icelandic universities. The application of questionnaires to 183 academics from seven universities in Iceland indicated that their engagement in third mission activities considered soft (community activities and external training and teaching) can be better predicted by individual factors such as age, work experience outside academia, openness to experimentation and academic performance. Whereas academics' engagement in third mission activities considered hard (applied research and commercialization) is better predicted by organizational factors such as the size of the university or its departments, type of university (private or public), age of the university, whether it is more or less research-oriented, whether funding is academic or government, location of the university, number of disciplines in the areas of health and STEM. The authors concluded that universities should consider the diversity of academic profiles to promote engagement in different types of third mission activities.

Similarly, Fuller & Pickernell (2018) studied 144 British universities to understand the different types of university involvement with entrepreneurship and identified four groups of entrepreneurial activities:

- I. University knowledge exploitation activities: a range of activities involving the creation, exchange, and exploitation of university knowledge, such as research contracts, patents,

disclosures and university-owned spin-offs. This represents the broadest and most traditional group of entrepreneurial activities;

- II. Employee spin-offs: companies created by faculty members, with no direct link to the university's intellectual property;
- III. Non-university spin-offs: companies based on university intellectual property, but whose ownership has been transferred; and
- IV. Graduate startups: businesses started by former students with formal support from the university, related to entrepreneurial education. The inclusion of this group as an entrepreneurial metric is innovative and still under-explored in literature.

Fuller & Pickernell (2018) suggest that different institutional factors (such as focus on teaching or research, funding, organizational structure) influence the types of entrepreneurial activities carried out and concluded that universities tend to excel in only one or two groups. University knowledge exploitation activities are the factor most associated with Russell Group universities (a consortium of 24 research-intensive British universities, often considered the most prestigious in the United Kingdom), while newer universities excel in the creation of graduate startups. Employee and graduate spin-offs are more common at universities outside the Russell Group, indicating greater diversity in entrepreneurial activities. The type of third mission activity has implications for public policy, especially in the distribution of resources and the valuation of different forms of university impact (Fuller & Pickernell, 2018; Fuller, Beynon and Pickernell, 2019).

Etzkowitz *et al.* (2018) state that the entrepreneurial university is characterized by: project-based learning; research focused on practical applications; and partnerships with public and private actors. The authors highlight the importance of promoting a more inclusive and systematic culture of innovation and they differentiate eight aspects between traditional universities and entrepreneurial universities, as shown in Chart 13.

Chart 13. Contrast between traditional universities and entrepreneurial universities

Spectrum Category	Traditional University	Entrepreneurial University
University-society relationship	Isolated from society	Open and serving external society. An entrepreneurial university interacts closely with industry and government.
Place of learning	Teaching on campus	Teaching on and off campus
Mission of knowledge	Production of knowledge for its own sake	Multipurpose knowledge, both theoretical and practical, simultaneously
Research	Winding flow of basic research	Multiple sources influence the direction of research
Intention related to knowledge	Useful knowledge as chance	Useful knowledge is sought
Technology transfer and innovation to industry	Technology Transfer Office, administrative unit with limited scope	Technology Transfer Office and incubator integrated into the innovation strategy to foster startups
Organization of disciplines	Departments based on disciplines as primary units	Departments and Interdisciplinary Centers with equal status
Stakeholders	Only internal stakeholders	Multiple parties

Source: adapted from Etzkowitz *et al.* (2018).

Furthermore, Bronstein & Reihlen (2014), between 1998 and 2013, examined similarities and differences between institutions aspiring to become entrepreneurial universities through a cluster analysis of 27 case studies from 18 countries around the world (except Africa), and produced a typology of archetypes according to each institution's main driver: research, industry, innovation or commerce. The authors state that archetypes help to understand the diversity of organizational responses to the pressure for entrepreneurship in higher education and concluded that there is no single model of an entrepreneurial university. Universities tend to converge toward distinct archetypes, influenced by factors such as: (i) institutional heritage (path dependency); (ii) economic and political environment; and (iii) organizational culture and leadership.

Chart 14 presents the views of these authors, in addition to the views of Pickernell *et al.* (2019) and Ishizaka *et al.* (2020), who studied exclusively universities in the United Kingdom and state that they present a wide variation of third mission activities in their portfolios. For this reason, like Bronstein & Reihlen (2014), the authors believe that the four strategic profiles identified could also be considered in other international contexts for the development of public policies that promote entrepreneurship.

About the location of HEIs, Silicon Valley covers several cities in the state of California, in the United States, and has several actors as an integral part of a regional innovation ecosystem

formed by global technology companies, startups and around forty HEIs that seek to integrate teaching, research and entrepreneurship – notably Stanford University (in Palo Alto), University of California (in Berkeley and Santa Cruz), Carnegie Mellon (in Mountain View) and Santa Clara University and San Jose State University (in the cities of the same name).

One example of a university that has incorporated entrepreneurial practices is the Massachusetts Institute of Technology (MIT) in the United States, which was already considered an entrepreneurial institution before the 1980s. MIT has become the leading incubator of companies among American universities, accounting for 5.5% of patents granted to universities and 3.3% of startups created by them (Oliveira, 2014). Another example is Stanford University, which represents an evolving model of an entrepreneurial university and, despite the high number of startups, neglected novice researchers whose inventions were not ready for immediate licensing. By way of example, the following initiatives have significantly improved the business infrastructure of that institution (Etzkowitz *et al.*, 2018):

- Biodesign: a program that identifies clinical needs and develops medical solutions;
- SPARK: provides training in entrepreneurship (two-year program), financing, an extensive network of researchers and mentoring in the medical field;
- d-School: teaches design thinking through short-term projects and seminars that promote creative and interdisciplinary thinking to integrate and coordinate various innovation initiatives;
- StartX: a startup accelerator created by students that acts as a "representative" of the university to Silicon Valley; and
- Radicand: consulting and coworking space for hardware innovation, which acts as the “hands” for inventors who are unable to materialize their ideas on their own.

The examples of Stanford University and MIT illustrate the return on investment for the American economy generated by technology transfers and university entrepreneurship, which leads to new cycles of technology generation. According to a study by Oliveira (2014), American HEIs contribute to economic expansion and market creation, and promote innovation and gains in productivity and competitiveness.

Chart 14. Simplified typology of entrepreneurial university archetypes

	Research-oriented Entrepreneurial University	Technical Entrepreneurial University (industry-oriented)	Innovation and Service-Oriented Entrepreneurial University	Commercial Entrepreneurial University (knowledge commercialization-oriented)
Main mission	Academic excellence	Technical specialization	Problem-solving service	High-tech research specific to sectors
Major financial resources	Public and multilateral research funds	Multilateral and industry funds	Private sponsorships and public funding programs	Own revenue from licensing
Transfer structures	Science parks and research centers	Incubators, technology transfer offices, formal and informal networks with regional industry	Incubators, consulting, training centers and startup support	Incubators, technology parks, high-tech research and development centers and spin-offs
Other key features	Leads specialization in a specific field of research	Plays an important role in the regional economy, offers market-oriented education, has a strong reputation and regional support	Flexible structure responsive to project opportunities, promotes interdisciplinary research projects	Emphasizes public relations and marketing to maintain a strong image
Illustrative cases	Stanford University (United States); University of California, Berkeley (United States); Catholic University of Chile	University of Waterloo (Canada); University of Joensuu (Finland); University of Leeds (United Kingdom)	Copenhagen Business School (Denmark); University of Warwick (United Kingdom); University of East Anglia (United Kingdom)	University of Twente (Netherlands); Waseda University (Japan); University of Cambridge (United Kingdom)
In the view of Pickernell <i>et al.</i> (2019):	Weak external business income: low external income generation with small and medium-sized enterprises.	Broad focus and strategy, with multiple activities. These are more difficult to implement and may be more effective in intermediate regions.	Focus on teaching: continuous professional development, consulting and services. These are more common in peripheral regions, where these activities have a greater impact.	Focus on intellectual property exploitation and knowledge commercialization. These tend to be found in economically stronger regions.
In the view of Ishizaka <i>et al.</i> (2020):	Indifferent Universities: low intensity and low diversity in knowledge transfer activities.	Broad Universities: low intensity and high diversity in knowledge transfer activities (such as collaborative research, contracts and consulting).	Focused Universities: high intensity and low diversity in knowledge transfer activities (such as paid events and continuing professional development).	Ambidextrous Universities: high intensity and high diversity in knowledge transfer activities (such as licensing, contract research, spin-offs and spin-outs). These are the ones that lead the university rankings.

Source: author, adapted from Bronstein & Reihlen (2014).

In Brazil, Silva *et al.* (2021) conducted a comparative case study of three public universities in Minas Gerais that stood out in 2019 in the RUF and Entrepreneurial HEIs rankings (see

subsection [3.3.1](#) and item [3.3.3.9](#), respectively) to analyze their entrepreneurial characteristics. The authors found that the three universities have the following in common: robust structures to support entrepreneurship; they offer curricular and extracurricular entrepreneurial courses; they hold events, competitions, and ideation and pre-acceleration programs; and they maintain incubators and technology parks with regional impact. Among the difficulties observed, there were lack of institutionalization of entrepreneurial actions; concentration of initiatives in specific departments; bureaucratic and cultural barriers to greater university-business integration; and difficulty in student engagement due to the traditional curriculum load.

Regarding the commercialization of research by academics, Louwrens, Solomon and Pettersen (2023) studied the case of Stellenbosch University in South Africa and concluded that academics want their research to have a social impact beyond scientific publication, but there is tension between publishing and commercializing, as only publication is considered in performance indicators (rankings). In addition, awareness of the possibility of commercializing research is limited and influenced by previous experiences, mentors, informal networks and exposure to entrepreneurial environments. Intellectual property structures and profit sharing with the university are also seen as disincentives to pursuing research commercialization.

The work of van De Burgwal, Dias and Claassen (2019) sought to understand how 48 of the highest-ranked European universities in the 2014/2015 edition of THE rankings (see subsection [3.3.1](#)) establish incentives to promote the valorization of knowledge and it identified the following types of incentives and their respective effectiveness as perceived by the technology transfer and research professionals interviewed:

- Career progression: most effective incentive.
- Revenue sharing (patents, consulting, products): moderately effective.
- Sharing of university resources: moderately effective.
- Shareholding: not very effective.
- Awards and bonuses: not very effective.

The authors concluded that perceived effectiveness did not directly correspond to presence and desirability, indicating that additional motives play a role in the implementation of incentives.

It is up to each university to review the motives behind each one to promote engagement and institutional legitimacy (van De Burgwal, Dias and Claassen, 2019).

Pickernell *et al.* (2019) analyzed 162 universities in the United Kingdom in terms of their knowledge exchange strategies with small and medium-sized enterprises and concluded that the most relevant activities for measuring the entrepreneurial character of universities are: consulting, continuing professional development, software licensing, non-software licensing and contract research. The following were excluded: sales of spin-off shares, other intellectual property income and services related to facilities and equipment.

It is worth noting the difference between the English terms “enterprising” and “entrepreneurial”, which in Portuguese can both be translated as “empreendedor(a)”. Fuller, Beynon and Pickernell (2019) define entrepreneurial universities as those focused on activities related to their own innovation, thus operating in a narrower range of activities, mainly for their own benefit. Enterprising universities, on the other hand, are defined as those whose focus of activities is broader and more balanced, benefiting themselves and the economy in a more comprehensive manner.

Along the same lines, Fernández *et al.* (2018) differentiate entrepreneurial universities from innovative universities, since the term “entrepreneurial” is considered limited because it focuses on business creation and technology transfer. In contrast, university innovation involves change, novelty and social return, being more comprehensive and requiring interaction with stakeholders as an indispensable element for its success. An innovative university is one that promotes innovation across its two core missions: education and research. Innovation must be supported by three main dimensions, whose impact is modulated by relationships with the environment: institutional leadership and governance; teaching and learning systems; and research, development and knowledge transfer.

It is also worth noting the distinction made by Dvoretzkaya *et al.* (2023) between high-tech universities, which depend on public funding and assume a high level of risk in implementing progressive educational programs aimed at creating innovations, based on the modernization of their equipment (which must not be more than five years old) for research and development activities. In their work, the authors limit themselves to the context of Russia and argue for the inconvenience of entrepreneurial universities in the Decade of Science and Technology (2022-

2031), attributing to them the decline in the academic performance of Russian HEIs in the QS ranking (see subsection [3.3.1](#)) and stating that high-tech universities are preferable for the innovative development of higher education in that country.

Finally, it is worth highlighting the existence of organizations focused on promoting and developing entrepreneurial universities. One example is the British organization National Centre for Entrepreneurship in Education (NCEE). Founded in 2004, with a base also in China, it acts as a platform and collaborative network for sharing practices, insights, and research, and rewards entrepreneurial universities through the Entrepreneurial University Award (NCEE, 2025).

3.2.2 Entrepreneurial Education

The development of entrepreneurial education programs has evolved over the last eight decades, beginning in 1947 at Harvard University (United States), with a focus on cultivating an entrepreneurial mindset among students, and during the mid-1970s at the University of Southern California (United States) and Babson College (United States). By the late 1980s, these programs had expanded around the world, when the focus shifted from teaching students to becoming entrepreneurs to understanding entrepreneurship in the context of small business management. In the late 1990s, the focus changed again, this time to stimulate the development of creative thinking and innovative problem-solving skills that could be applied in a corporate context to transform these students into more desirable employees (Llorente-Portillo *et al.*, 2024).

Currently, entrepreneurial education programs focus on providing students with the knowledge and skills necessary to establish scalable, cutting-edge ventures based on innovative technological ideas (Kuratko & Morris, 2019). For Chais (2019), entrepreneurial culture should be encouraged from graduation onwards, and Lu *et al.* (2023) recommend greater investment in incubation spaces, teacher training and the inclusion of innovation and entrepreneurship in all areas of higher education. However, the literature suggests that entrepreneurial education alone has no impact on students' intentions to become entrepreneurs and start businesses (Llorente-Portillo *et al.*, 2024).

Farrell *et al.* (2024) studied academic entrepreneurship in low- and middle-income countries and explored factors beyond entrepreneurial education itself. An entrepreneurial organizational culture, an efficient research infrastructure, a variety of financing options, leadership training, collaborative networks and reduced bureaucracy act as facilitators in promoting entrepreneurship in universities. In contrast, limited funding opportunities, unresponsive administrative support, lack of discretionary funds, institutional bureaucracy and contractual inefficiencies between universities and partners act as barriers. The authors recommend that universities:

- Provide formal support through strategic leadership guidance and training programs, and create a group of mentors who can assist academic entrepreneurs with their financing and capital raising needs, such as the University of Houston (Brasil Júnior, 2020);
- Support academic entrepreneurs in developing and maintaining their professional networks by establishing opportunities for knowledge sharing among their peers to promote networking and offer benefits at the local level;
- Incorporate academic entrepreneurship into their business model and strategy, along with teaching and research priorities, as Princeton University has done (Brasil Júnior, 2020), and include entrepreneurship indicators in performance evaluation processes to adequately recognize entrepreneurial performance.

Similarly, the work of Dick-Sagoe *et al.* (2023) with 930 students (620 undergraduate and 310 graduate) from 31 departments at the National University of Lesotho identified that, in order to foster entrepreneurship, it is necessary to: integrate entrepreneurship disciplines into all university courses; create favorable environments with institutional support, mentoring and funding (especially among graduate students); and involve social leaders to change cultural norms that discourage entrepreneurship. The study found that students of business administration, economics, nutrition, pharmacy and business development showed greater entrepreneurial intent, while students of history, philosophy, procedural law and French showed less entrepreneurial intent. When undergraduate students were compared with master's students, the latter showed greater entrepreneurial intent.

Llorente-Portillo *et al.* (2024) investigated 25 students in the 4th semester of the bachelor's degree in Entrepreneurship at the Monterrey Institute of Technology and Higher Education, in

Mexico, to ascertain how academic programs specializing in entrepreneurship influence the entrepreneurial intention of university students and to understand whether exposure to specific educational methodologies increases the intention to become an entrepreneur. The authors concluded that the courses did not substantially alter the students' entrepreneurial intention. The combination of theoretical and procedural methodologies was not sufficient to generate significant changes in entrepreneurial intention. More realistic and problem-based approaches may be more effective in stimulating entrepreneurial attitudes and intentions.

In this regard, Konak *et al.* (2024) analyzed 194 students from two universities in the United States who participated in student innovation competitions and programs and concluded that these initiatives are effective in developing students' technical, entrepreneurial and innovative mindset skills. The results indicated that the type of competition/program influences skill development: competitions/programs that focused on solutions, rather than just technical skills, and that incorporated elements of entrepreneurship and social impact promoted greater development of innovation, empathy and stakeholder communication skills.

Entrepreneurial education should focus on developing personality traits and offering practical experiences (Yang, 2024). University policies that foster external networks with entrepreneurs and practical examples (history of university spin-offs) may be more effective than theoretical courses. Krabel *et al.* (2018) surveyed 10,000 graduates between 2007 and 2008 at German universities ranked in the entrepreneurial orientation ranking provided by Ludwig Maximilian University in Munich to investigate how the entrepreneurial orientation of these HEIs and the human capital of graduates influence the occupational choice of graduates, especially the decision to become entrepreneurs after graduation. The authors found that formal entrepreneurial education had no significant effect and that students' previous practical experience is more relevant to entrepreneurial intention than traditional academic indicators (such as grades and international mobility). This was also found by Yang (2024), whose research investigated universities in mainland China: students with internship or work experience showed greater entrepreneurial intention. In that case, there was no significant difference in entrepreneurial intention between age groups or fields of study.

Other relevant findings by Krabel *et al.* (2018) were that women and graduates with children are less likely to become entrepreneurs, and that the rate of entrepreneurs in the university region did not significantly influence graduates' decisions. The entrepreneurial culture of the

university (i.e., the university's orientation toward entrepreneurship) positively influences graduates' career choices to become entrepreneurs. Therefore, universities can be active agents in promoting entrepreneurship.

Misiak-Kwit, Wiscicka-Fernando and Fernando (2021) surveyed 500 business students from five countries (100 from each: China, Georgia, Poland, Romania and Sri Lanka) and concluded that collaborative experiences can stimulate the desire to start a business, as the experience of co-creation is strongly associated with the intention to become an entrepreneur. They also found that one in five respondents was uncertain about their own career plans and whether or not they had an entrepreneurial mindset, indicating a gap in the educational system. In this regard, the authors recommend raising student awareness. In China, research shows that the support for entrepreneurship offered by universities has a positive impact on entrepreneurial intentions. Examples of universities with innovative practices in their educational mission include (Fernández *et al.*, 2018):

- Tomsk State University of Control Systems and Radioelectronics (TUSUR), a university in Tomsk, Russia: project-based learning with a focus on robotics and technological innovation;
- Stellenbosch University, in the city of the same name in South Africa: clinical training in rural areas with a shortage of health services;
- Monterrey Institute of Technology and Higher Education, in the city of the same name in Mexico: TEC21 educational model based on real challenges and active learning; and
- Aalto University, in the city of Espoo, Finland: student movement that promoted entrepreneurial culture and the creation of startups.

Lin & Shen (2019) interviewed 200 Chinese students divided into two groups of 100 each: young people who had already started their own businesses and students with entrepreneurial intentions. The authors identified that current training is considered unsystematic and fragmented. Other relevant findings include that motivation to become an entrepreneur is strongly linked to peer influence and compatibility between the university course and the business project; that the desire to become an entrepreneur arises early (by the second year), but implementation occurs later (third or fourth year); and that students identify the following as essential skills: professional knowledge, communication skills, viable projects, initial financing and practical guidance.

As a result, Lin & Shen (2019) propose a model for training young entrepreneurs in Chinese universities based on an "ecological chain", which includes:

- I. A progressive four-year system, aligned with students' academic and psychological development;
- II. Special courses that integrate professional and entrepreneurial training;
- III. A team of qualified tutors focused on practical guidance;
- IV. A scientific and efficient incubator, led by the university, with comprehensive services to support entrepreneurship;
- V. A focus on quality projects, with the dissemination of success stories to inspire other students.

The work of Al Amimi & Ahmad (2023) focused on digital entrepreneurship and identified that entrepreneurial education, knowledge, skills and technical competencies do not affect an individual's self-efficacy (see section [3.2](#)) or their intentions to become a digital entrepreneur. However, more individuals will start digital businesses if educational institutions promote creative entrepreneurial ideas, cultivate the necessary skills, provide the required knowledge and ensure the availability of communication and information technology tools. Therefore, the authors advise educational institutions and professional training centers to adopt experimental teaching and learning approaches in their entrepreneurial education programs and to include digital marketing and design thinking workshops in the curriculum. In addition, they suggest incorporating courses related to digital entrepreneurship that integrate technological and business skills.

Similarly, Dos Santos (2024), in his thesis, points out that active methodologies and institutional structures are fundamental to fostering entrepreneurship.

Although the idea of creating a startup remains a powerful and versatile pedagogical tool, entrepreneurial education is not just about learning how to turn an idea into a sustainable business. It is also about being exposed to entrepreneurial experiences and acquiring the skills and competencies to develop an entrepreneurial mindset and equip students to contribute to addressing challenging issues such as sustainability and the UN SDGs (HEInnovate, 2025).

Soam *et al.* (2023), in their study conducted in India with more than 1,700 undergraduate and graduate students from 17 state agricultural universities in the country, confirmed that this

exposure to entrepreneurial experiences (hearing success stories, interacting with entrepreneurs, visiting incubators) is a factor that influences the intention to become an entrepreneur in that context. Almost 80% of the sample showed interest in becoming entrepreneurs, and the motivations for entrepreneurship presented by the group surveyed were personal passion, desire for independence and the prospect of high income. Among the relevant skills listed by respondents are business plan development, marketing, technical skills, financial literacy (hard skills), and communication, leadership, teamwork and time management (soft skills). The authors recommend establishing career development centers in all HEIs to develop professional and entrepreneurial skills and promote university-industry partnerships to improve employability.

Regarding the development of an entrepreneurial mindset, the *alma mater* of the 56 Brazilians on Forbes' annual list of billionaires for 2025 (Forbes, 2025) was verified. It should be noted that some of the Brazilians on this list did not necessarily decide to become entrepreneurs, but rather appeared on the list because of their shareholding, as heirs, in their families' companies. It can be observed that, of those who completed higher education and whose information was publicly available: seven studied at the Federal University of Rio de Janeiro (UFRJ), five at Harvard University and/or Harvard Business School, five at Mackenzie Presbyterian University, four at the University of São Paulo (USP), three at the Pontifical Catholic University of Rio de Janeiro (PUC-Rio), three at the Getúlio Vargas Foundation (FGV), two at the Federal University of Paraná (UFPR), two at the University of Caxias do Sul (UCS), one at Cândido Mendes University (UCAM), one at the Regional University of Blumenau (FURB), one at the Pontifical Catholic University of São Paulo (PUC-SP), one at the Federal University of Minas Gerais (UFMG), one at the University of Southern Santa Catarina (UNISUL), and one at Santo Amaro University (Unisa).

Looking at the performance of the institutions listed above, Harvard University usually appears in all global academic rankings and its Business School is considered one of the most important institutions specializing in business administration in the world. When observing Brazilian HEIs in relation to previous editions of the Ranking of Entrepreneurial Universities (RUE)/Entrepreneurial HEIs (see item [3.3.3.9](#)), it is confirmed that some of them are recognized as entrepreneurial according to the dimensions and criteria adopted by that ranking system (Table 3).

Table 3. Performance of the *alma mater* of Brazilian billionaires listed in Forbes 2025 – Brazilian HEIs in the RUE/Entrepreneurial HEIs (2016 to 2023 editions)

HEI	RUE 2016 (42 HEIs)	RUE 2017 (55 HEIs)	RUE 2019 (123 HEIs)	RUE 2021 (126 HEIs)	Entrepreneurial HEIs 2023 (139 HEIs)
UFRJ	17	11	12	19	27
Presbyterian Mackenzie	-	-	-	-	-
USP	1	1st	1st	2nd	1
PUC-Rio	3rd	5	24th	80	-
FGV	-	-	-	-	-
UFPR	26th	10th	17th	30th	24
UCS	-	20	28	24	-
UCAM	-	-	-	-	-
FURB	-	-	31st	86th	-
PUC-SP	-	-	-	-	-
UFMG	6th	2nd	3rd	4th	4
UNISUL	-	-	56th	109th	-
Unisa	-	-	-	-	-

Source: author, based on the books for each edition of the ranking, available at Universidades Empreendedoras (2025).

Similar to GEM (see subsection 3.2), the Global University Entrepreneurial Spirit Students Survey (GUESSS) is also a global research project that has been in existence since 2003 and contributes to characterizing the antecedents, contexts, outcomes and conditions of student entrepreneurship. This initiative is carried out every two years and has provided data to inform and inspire researchers, professionals and policymakers to support and strengthen entrepreneurship among students. The tenth and most recent edition took place in 2023 and had more than 226,000 responses from 57 participating countries. In the Brazilian context, GUESSS has been conducted since 2011 and is supported by Anegepe, as is GEM. The data presented in Table 4 below are from the 2023 National Report for Brazil, which included 7,447 students from more than 30 HEIs in the country.

Table 4. Student entrepreneurship in Brazil in 2023

Students' entrepreneurial intentions and activities	Influencing factors
15% of respondents expressed their intention to become entrepreneurs immediately after completing their studies (undergraduate). This group can be described as "direct and intentional entrepreneurs".	Entrepreneurship education and the entrepreneurial climate at HEIs remain determining factors in entrepreneurial intentions and activities.
26.2% of respondents indicated that they wish to become entrepreneurs five years after completing their studies – a frequency that has remained relatively consistent since the first edition in Brazil, ranging from 39.1% in 2011 to 38.4% in 2021. However, the notable decrease in 2023 showed a change in this trend.	Business, architecture and engineering students most often display an entrepreneurial spirit.
A stable pattern described as "first employee, then entrepreneur" was observed: 77% of respondents indicate that they prefer to seek employment immediately after completing their studies. This	In the long term, five years after completing their studies, women (51.5%) show a higher frequency of entrepreneurial intention compared to men (47.9%). However, in the "emerging/nascent entrepreneurs" and "direct and intentional entrepreneurs" groups, the

Students' entrepreneurial intentions and activities	Influencing factors
intention decreases to 67% five years after completing their studies.	percentages of women and men are practically equivalent.
83% of those who wish to start a business immediately after graduation maintain this intention five years later.	The only instance of gender disparity in which the percentage of men (53%) exceeds that of women (46.2%) concerns the frequency of active entrepreneurs among students.
Among the student respondents, 21.8% are in the process of creating their ventures as "emerging/nascent entrepreneurs", while 10.1% are already established and operating their businesses as "active entrepreneurs". Only 5.6% of the businesses have received venture capital.	On a scale of 1 to 7, both emerging/nascent (4.5) and active (4.2) entrepreneurs reported a slightly higher level of subjective well-being when compared to the overall average for Brazilian students (4.12). Business students have the highest well-being scores (4.38), while natural science students have the lowest (3.78).
Contrary to expectations, between 47.5% and 49.9% of students from different entrepreneurial groups (emerging/nascent, active and direct) did not take courses in entrepreneurship. When considering all students, including non-entrepreneurs, this percentage increases to 56.5%.	A relatively high percentage of student businesses were created between 2020 and 2023, during the COVID-19 pandemic, with numbers ranging from 13.1% to 17%, compared to 9.1% in 2019. While this trend appears to have a positive impact on the economy, data from the 2022 GEM Brazil study suggest that these businesses are usually small and created out of necessity.

Source: adapted from Lima & Silva (2024).

Given these results in Brazil, Lima & Silva (2024) recommend that universities and public policy makers promote entrepreneurial education in all areas, create inclusive environments, and support social entrepreneurship as a tool for transformation.

Still about entrepreneurial education in the Brazilian context, it is worth highlighting the Brazilian University Extension Indicators (IBEU), which are a set of metrics and tools developed to evaluate and monitor university extension activities in Brazilian public higher education institutions. Entrepreneurship appears in the “infrastructure” evaluation dimension, under the qualitative indicator (yes or no) of “availability of adequate spaces to support entrepreneurship (incubators, support offices, etc.)” (Maximiano Júnior *et al.*, 2017).

3.2.3 Compilation of literature on entrepreneurial universities

Ruiz & Martens (2019) conducted a review of the literature of articles published up to 2017 on entrepreneurial universities and organized the elements that characterize them into six main dimensions, as shown in Chart 15.

Chart 15. Proposal for a theoretical model of entrepreneurial universities

Dimensions	Elements
Management	Transition to strategic management and entrepreneurial culture, in which opportunities are geared toward economic and social functions, oriented toward the creation of public value, regardless of financial resources. Entrepreneurial, participatory, professionalized, committed, dynamic and reinforced leadership. Curriculum and program renewal
Infrastructure	Technology transfer and intellectual property offices Centers for meeting the demands of society, including industries Technology parks Incubators/accelerators Modern and interdisciplinary research centers
Internationalization	Creation of exchange programs between students and teachers Encouragement to publish research in international journals
Financial capital	Budget (budgetary autonomy) Raising external funds
Academic community	Implementation of collective and collaborative work between courses and other educational institutions (sharing of practices and research) Entrepreneurial education programs Trains professionals for an entrepreneurial culture Consulting, from ideation to the creation of startups Recognition/awards for teachers and students
Entrepreneurial ecosystem and partnerships	Internal partnerships External partnerships: university-government External partnerships: university-business External partnerships: university-other HEIs

Source: adapted from Ruiz & Martens (2019, p. 134).

Similarly, Dolcimasculo (2020) presents a consolidation of the findings of his systematic review on “entrepreneurial universities with an institutional approach”. In Chart 16, for each of the dimensions (analytical categories) of an entrepreneurial university, an internal environmental factor (subcategory) was associated that influences an institution whose vision is to be recognized as an entrepreneurial university. For the definitions of each subcategory, see [Annex A](#).

Sriteerawasu & Niramitchainont (2022) also studied nine entrepreneurial universities across three continents: in America, the University of Waterloo in Canada; MIT and Stanford University, both in the United States. In Europe, the Estonian University of Applied Sciences (EUAS); Chalmers University of Technology in Sweden; and the University of Twente in the Netherlands. In Asia, the National University of Singapore (NUS); the University of Hong Kong (CUHK); and Tsinghua University in China. The authors identified the main characteristics of these institutions and divided them into five dimensions, as shown in Chart 17.

Chart 16. Categories and subcategories of characteristics of entrepreneurial universities

Analytical categories (dimensions)	Subcategories (internal environmental factors)
Faculty	Research/Publication Academic Quality Personnel Qualifications
Entrepreneurial Culture	Entrepreneurial Attitude Entrepreneurial Education Employability University Enterprise Entrepreneurial Mindset Methodology
Academic Management	Strategy Governance Structure Organizational Structure Interdisciplinarity Mission Incentive Policy Support Network
Diversified Income	External Resource Fundraising Applied Research
Support for Innovation	Support for Innovation Regional Engagement Innovation Incentives Infrastructure and Support Reward System Knowledge and Technology Transfer

Source: adapted from Dolcimasculo (2020, p. 63).

Chart 17. Dimensions and characteristics of entrepreneurial universities

Dimensions	Characteristics
Entrepreneurial leadership and strategies	Entrepreneurship as a university strategy High commitment to entrepreneurial strategy Integration of entrepreneurial activities Regional support for entrepreneurship development Financial support from stakeholders Sustainability of financial support Entrepreneurial mindset Entrepreneurial investment in team development Rewards and incentives Valuing external stakeholders Impact assessment Education for entrepreneurial engagement and startup support activities
Teaching and instruction for entrepreneurial development	Development of entrepreneurial skills Promotion of entrepreneurial approaches, diversity and innovation Support for entrepreneurial behavior Learning outcomes in entrepreneurship Engagement of external stakeholders Integration of entrepreneurial education Entrepreneurial awareness Individual support for entrepreneurship Entrepreneurial experience Entrepreneurial action and practice Availability of mentoring services Facilitated access to financing Access to business incubation

Dimensions	Characteristics
Interdependence and relational engagement	Knowledge exchange Stakeholder involvement Connection with incubators Support for the external and business environment Mobility mechanism Incorporation of research
Internationalization	Internationalization as a university strategy Support for international mobility International individuals and entrepreneurs Internationalization in the teaching approach Participation in international networks
Technological implementation	Encouraging the use of technology Investment in innovative technology Coordination with the technological business sector Technological education and training Assessment of the impact of technological application

Source: adapted from Siriteerawasu & Niramitchainont (2022, pp. 196 and 197).

Chart 18 presents the author's compilation of the dimensions to be explored by universities that aim to be recognized as entrepreneurial, considering the findings of the systematic literature review conducted here, as well as comparing the three studies by Ruiz & Martens (2019), Dolcimasculo (2020) and Siriteerawasu & Niramitchainont (2022).

Chart 18. Common dimensions in entrepreneurial universities

Dimensions	Definitions
Structure	Bottom-up structure ¹ to reduce bureaucratic and cultural barriers, processing times and internal approval procedures, translated through regulations and policies that support the coordination of entrepreneurial activities within the institution and with other stakeholders in the ecosystem. This implies flexibility to adapt to market and societal demands, knowledge management tools, the existence of an entrepreneurship professor position and someone at the Dean's/President's Office level to be responsible for the entrepreneurial agenda.
Strategy	Objectives that clearly express to everyone at the HEI the promotion of a mission and culture that celebrate entrepreneurship, innovation and social commitment. This includes pursuing internationalization in a manner that is integrated with the institutional pedagogical project. It involves defining one of the strategic archetypes, according to its main driver: Research-oriented Entrepreneurial University; Technical Entrepreneurial University (industry-oriented); Innovation and Services-oriented Entrepreneurial University; or Commercial Entrepreneurial University (oriented towards the commercialization of knowledge).
Leadership and specialized human resources	Participatory, professionalized, dynamic leadership committed to the entrepreneurial strategy. It includes aspects related to the teaching and technical staff, who should receive entrepreneurial development and training (not just leaders). It involves international recruitment; inclusion of entrepreneurship indicators in performance evaluation processes; recognition/awards for teachers and technicians engaged in innovative initiatives.

Dimensions	Definitions
Students and alumni	Both students and alumni can also be part of the HEI's workforce, adding to the university's human capital. They are a thermometer of institutional effectiveness and quality. This involves not only monitoring the academic engagement and entrepreneurial attitude of enrolled students but also following up with alumni to monitor indicators of their entrepreneurial performance and to ensure that they represent a support network as success stories. It means monitoring, for example, the percentage of "direct and intentional entrepreneurs", "emerging/nascent entrepreneurs" and "active entrepreneurs", graduation and retention rates, and the employability rate of graduates.
Finance	The management of the public budget received and the raising of external funds, not from government sources, in patents, contracted research, partnerships with private companies, federal development agencies and regional sources. This includes calculating the return on investment per student, monitoring the net sales revenue of companies founded by students and graduates (alumni), creating endowments ² and specific funds to promote entrepreneurship and startups, offering scholarships and financial aid to students in vulnerable economic situations, and incentives associated with knowledge transfer and the exploration of opportunities.
Entrepreneurial education	Offer students interdisciplinary professional and entrepreneurial training courses and programs in all university courses, using digital technologies (education and technological training), active methodologies (such as games, flipped classrooms, design thinking, project-based learning), with a focus on employability, the academic and psychological development of students, and the internationalization of the curriculum.
Entrepreneurial practice	Extracurricular collaborative experiences, for exposure to entrepreneurial environments for more realistic approaches, such as in innovation habitats: events (lectures, seminars, round tables), solution-focused competitions (contests, hackathons, boot camps), ideation and pre-acceleration programs, mentoring and consulting up to the creation of startups, participation in innovation projects and processes, encouragement of the creation of student organizations and associations (such as junior companies).
Technology and innovation infrastructure	Commercial, professional and physical infrastructure to connect universities to the productive sector and stimulate entrepreneurial thinking. This includes the physical assets and communication and information technologies of classrooms and innovation habitats: research and experimentation laboratories, coworking spaces, fablabs, hubs, Technological Innovation Centers, incubators, research centers, technology and intellectual property transfer offices, science and technology parks.
Activities for exploring university knowledge (or Commercialization, Applied Research and External Training and Teaching)	These represent the institutional commitment to knowledge exchange and technology transfer with society, industry and the public sector, with a focus on practical applications. They include innovations produced by faculty, students and technicians: publication of patents or patent applications; licensing; creation of or participation in spin-offs or startups; contracted research; partnership agreements; service provision projects (advisory services, expert opinions, consulting, specialized technical services). It includes external training and teaching: paid continuing professional development activities, which may also be offered in conjunction with industry or public organizations.
Collaborative innovation networks	Internal partnerships and partnerships between universities and government, universities and companies, universities and other HEIs: relational interdependence for the sharing of practices and research, which includes collaboration for the renewal of the curriculum by adopting internationalization in the teaching-research approach and inviting professionals from companies and social leaders to bring skills that are not available internally. This involves mapping the business needs of the local economy and coordinating with the technology business sector.

Dimensions	Definitions
Extension (or Community Activities and Popular Scientific Communication)	Active prospecting for problems and opportunities in the community, local companies or the public sector. Direct and indirect academic engagement with its immediate environment for knowledge transfer, such as public communication of science in collaboration with other HEIs and public institutions; contribution to public policies; volunteering for the benefit of the community; support for cultural and artistic activities; organization of conferences, lectures, public debates and workshops for non-academic institutions; provision of facilities for the external community.

¹ bottom-up: knowledge is formed at the base, and the structure is more horizontal, with few hierarchical levels between the top and the front line.

² set of private assets established, managed and administered by the endowment fund management organization with the aim of constituting a source of long-term resources, based on the preservation of the principal and the application of its income. Conceived as an important tool for promoting initiatives and financing causes or institutions of public interest.

Source: author.

It is possible to draw a parallel between the dimensions defined above and the KEI model presented in section [3.2](#), in the sense that the dimensions can be represented within the five antecedents that potentially lead to the development of entrepreneurial intentions:

- I. Personal desirability (the individual's personal belief about how desirable or undesirable the results are): finances; entrepreneurial practice; students and alumni; extension;
- II. Perceived social norms (perceived normative beliefs in one's peer group and the individual's reason for complying with the beliefs): structure; strategy;
- III. Perceived self-efficacy (the individual's perception of having the skills and self-confidence necessary to perform the task): entrepreneurial teaching; entrepreneurial practice; students and alumni; activities for exploring university knowledge;
- IV. Perceived collective efficacy (when other members are needed to support the entrepreneurial event, the group's shared belief in its ability to organize and execute the actions necessary to perform the task): leadership and specialized human resources; collaborative innovation networks; and
- V. Propensity to act (the individual's ability to independently execute an action plan and act on new opportunities identified): technology and innovation infrastructure.

The following section will present how the entrepreneurial performance of HEIs can be evaluated.

3.3 EVALUATION OF THE ENTREPRENEURIAL PERFORMANCE OF HEIs

According to Dolcimasculo (2020), global rankings still prioritize traditional indicators (research and reputation), leaving aside fundamental dimensions of the entrepreneurial university. In view of this, the author proposes a review of the evaluation criteria to include aspects that better reflect the role of universities in regional development and the promotion of entrepreneurship.

Fuller, Beynon and Pickernell (2019) point out that, due to the disparate nature of third mission university activities, having a university classification system using these specific types of activities could provide government policymakers with a greater understanding of the strengths of universities in a new range of metrics that consider multiple types of third mission activities.

3.3.1 University ranking systems

Today, rankings are considered important by almost all academic institutions worldwide. They are an official “seal of quality” for institutions that obtain good positions in these rankings, which increases their ability to “sell their products” in the heated global education market (Prado, 2023).

The first international rankings for academic evaluation appeared in the 2000s (Calderón & França, 2018), with the aim of identifying “world-class” academic institutions. Bazhenkov *et al.* (2023) state that the concept of competitiveness is intertwined with the evaluation of HEIs in national and international rankings, such that rankings are considered a way to monitor and evaluate the competitiveness of these institutions. However, the authors note that the classifications derived from rankings are characterized by different target audiences (the main consumers of that information), the method used to obtain results and the evaluation methodology.

Chart 19 shows what university rankings measure and what they do not measure. The central role they play is highlighted in the following studies:

- They influence students' choices of universities (Challenge Success, 2018) and, consequently, which universities benefit from the revenue they bring in – in the case of private, fee-paying institutions (Lynch, 2013);

- They have an impact on trade (Cantwell, 2016) and regional economic growth (Kochetkov, Larionova and Vukovic, 2017);
- They are reflected in tuition fees and, in some cases, even in the salaries of university presidents/deans (Yeung *et al.*, 2019) – in the case of private, fee-paying institutions;
- They impact immigration policies (Ordorika & Lloyd, 2013) – the number of young people traveling abroad to study has increased by around fifty percent since 2000 (Lynch, 2013); and
- They interfere with the flow of graduate students, the hiring of professors and philanthropic and financial support (Badat, 2010).

Chart 19. What university rankings measure

University Rankings	
What they measure	What they do not measure
<ul style="list-style-type: none"> ▪ Internationalization ▪ Student and faculty characteristics (productivity, admission criteria, faculty/student ratio) ▪ Research in biological and medical sciences ▪ Publications in Nature and Science ▪ Reputation among peers, employers and students 	<ul style="list-style-type: none"> ▪ Teaching and learning (“added value”) ▪ Impact of research on teaching ▪ Research in Social Sciences, Arts and Humanities ▪ Technology/knowledge transfer or research impact and benefits ▪ Regional or civic engagement ▪ Student experience

Source: adapted from Hazelkorn (2013).

The main objective of the ranking is to evaluate the position of the HEI as a whole and its achievements in the areas in which it operates, to prevent the dispersion of resources and the inefficient use of human capital (Bazhenkov *et al.*, 2023). In this scenario, university rankings can be considered from different perspectives (Hazelkorn, 2013) for:

- Students: indicate the monetary potential or benefits that the university can provide in terms of their future profession and salary;
- Stakeholders: they signal the quality of the educational product and the benefits of the revenue brought in by students – in the case of private, fee-paying institutions;
- Employers: indicate what can be expected from graduates of a given HEI;
- Those responsible for formulating government public policies: suggest the level of quality and international standards, as well as their impact on national economic capacity and ability;
- HEIs: provide the means to compare their performance with each other;

- The public: they offer valuable information on the performance and productivity of HEIs in a simple and easy-to-understand way.

Righetti's thesis (2016) concluded that upper-middle-class students with good academic performance use rankings to choose universities, and that students who consult rankings tend to change courses or universities less often. It also found that rankings influence students seeking traditional careers (such as medicine, law and engineering) more. From the point of view of impacts on university management, among the strategies adopted to climb the rankings are hiring award-winning professors, increasing scientific publications, internationalization (courses in English to attract foreigners), and using rankings as an institutional marketing tool. About the impacts on public policy, she found that positions in the rankings influence the distribution of public and private resources and that well-positioned universities receive more resources and continue to stand out, which led her to warn of the need to formulate fairer public policies (Righetti, 2016).

Hazelkorn, Loukkola and Zhang (2014) state that rankings have a real impact on HEIs and have raised awareness about quality, transparency and competitiveness in higher education, but their use must be strategic and critical. Rankings should not be the sole criterion for evaluation, nor should they replace internal evaluations or decisions based on institutional mission. Rankings are widely monitored by HEIs, although they are not always an explicit part of their strategy.

Liao & Maulana Suprpto (2024) investigated 240 universities in thirteen countries in East Asia and Southeast Asia, using secondary data from the QS World University Rankings (see below in this subsection) and the SciVal database, and concluded that universities with greater proactivity and innovation (considered entrepreneurial behaviors), and with dynamic capabilities (market exposure, strategic collaboration and knowledge generation) tend to achieve higher positions in international rankings. According to the study, the competitive advantage of HEIs (reputation, human capital and scientific output) is strongly associated with their performance in rankings, and the interaction between entrepreneurial behaviors and dynamic capabilities generates a synergistic effect that enhances the performance of universities in these rankings.

Chart 20 briefly describes the main university rankings, in chronological order of their creation. For details on the methodology of these rankings, see [Annex B](#).

Chart 20. Main university rankings, in chronological order of creation

Ranking	Year of creation	Brief description
Academic Ranking of World Universities (ARWU), also known as the Shanghai Ranking	2003	The first international university ranking was created at Shanghai Jiao Tong University to compare scientific output among "world-class" universities (Shanghai Ranking, 2024).
Webometrics Ranking of World Universities	2003	Created by the Higher Council for Scientific Research (CSIC), Spain's largest public research body. It emerged as an initiative of the Cybermetrics Lab research group for quantitative analysis of Internet and Web content, especially that related to the generation and academic communication of scientific knowledge. Cimetric indicators are useful for evaluating science and technology and complement the results obtained with bibliometric methods (Webometrics, 2024).
Times Higher Education World University Ranking (THEWUR)	2004	<p>Organized by the British newspaper Times Higher Education (THE), it covers the three main areas of university activities (THE, 2022):</p> <p>> THE Global Rankings: created in 2004, it seeks to evaluate university performance on a global scale and be a source that promotes understanding of the different missions of higher education institutions. It provides a list of the best universities in the world, with an emphasis on research. The comparisons made by THE are subsequently published in regional and thematic series, such as Arab University Rankings, Asia University Rankings, Latin America University Rankings, World Reputation Rankings and Young University Rankings.</p> <p>> THE Teaching Rankings: created in 2016, it seeks to evaluate those universities that are not eligible for THE Global because they are not sufficiently focused on research. It is a ranking that places student engagement and success at its core. Its focus is geographical, given that data associated with teaching, and issues related to it, tend to be more local than global in nature. Only one such ranking has been published by THE, which presents the Japanese scenario since 2017 (Japan University Rankings).</p> <p>> THE Impact Rankings: created in 2019, it assesses universities on their progress in delivering each of the seventeen UN SDGs.</p>
Performance Ranking of Scientific Papers for World Universities, also known as NTU Rankings	2007	Created by the Higher Education Evaluation and Accreditation Council of Taiwan (HEEACT), in partnership with National Taiwan University (NTU). It evaluates the performance of institutions based exclusively on bibliometric indicators extracted from scientific production indexed in the Web of Science-Clarivate database. Certain areas are given priority when calculating academic production, such as the Exact and Biological Sciences (NTU, 2024; EGIDA/USP, 2024).
Leiden Ranking (CWTS)	2008	Organized by the Centre for Science and Technology Studies (CWTS) at Leiden University in the Netherlands. It provides information on the scientific performance of nearly 1,000 universities worldwide (Leiden Ranking, 2024).
Best Global Universities Rankings	2008	Created by US News & World Report, it evaluates American educational institutions, as well as more than 80 other countries, in terms of academic research performance and global and regional reputation, ranking around 1,500 universities worldwide (US News, 2024).
SCImago Institutions Rankings (SIR)	2009	Created by the Spanish consulting firm and research group network SCImago, it ranks HEIs based on three criteria: research, innovation

Ranking	Year of creation	Brief description
		and social impact, which are broken down into indicators (SIR, 2024).
Quacquarelli Symonds (QS) Top University Rankings	2010	<p>Created by the British company Quacquarelli Symonds (QS), which provides services focused on higher education, it was broken down into several rankings, including (QS, 2024):</p> <ul style="list-style-type: none"> > QS World University Rankings: ranking of more than 1,500 institutions, published annually. > QS Latin America & The Caribbean Rankings: regionalized series of rankings for Latin America and the Caribbean. > QS Sustainability Rankings: assesses the social and environmental impact of universities. Like THE Impact Rankings, this also includes compliance with the UN SDGs among its indicators.
Universitas Indonesia (UI) GreenMetric World University Ranking	2010	Created by the University of Indonesia, it is an initiative of a program at that institution called GreenMetric and evaluates universities around the world based on their commitment and efforts towards environmental sustainability on campus. It is recognized as the first and only university ranking in sustainability (GreenMetric, 2024).
University Ranking by Academic Performance (URAP)	2010	Developed by the Institute of Informatics at the Middle East Technical University, it is published annually with a focus on academic performance indicators for universities around the world. Both the quality and quantity of publications and collaboration in international research are used as indicators (URAP, 2025).
Round University Ranking (RUR)	2010	This Russian ranking presents 20 indicators divided into four areas: (1) teaching, (2) research, (3) international diversity, and (4) financial sustainability. The raw data is provided by Thomson Reuters and includes statistical data and information received from universities. Bibliometric data is extracted from the Web of Science Core Collection database. Reputation data comes from the Global Institutional Profiles Project (GIPP) survey of 10,000 members of the academic community (Dolcimasculo, 2020).
U-Multirank	2011	Created by the European Commission, it is suspended. It is based on the premise that there is no general classification of educational institutions. The classifications refer to each of the specific performance indicators, totaling 36, grouped into five dimensions: (1) teaching and learning; (2) research; (3) knowledge transfer; (4) internationalization; and (5) regional engagement. The classification is made for each indicator, without a single ranking, and users of the ranking can consult the indicators that are most important to them. Each bar representing the indicators is divided into five parts and painted in a dark color to represent the score received for that indicator. A complete dark bar represents an A grade, while a complete light bar represents that the data is not available. The absence of data is not necessarily a negative point in this ranking, given that “the user can disregard the missing information and focus on the available data, losing part of the information, but not the entire ranking” (Prado, 2023).
Center for World University Rankings (CWUR)	2012	In addition to providing a global university ranking, CWUR is in the United Arab Emirates and acts as a consultant on strategy and policy in the field of higher education for governments and educational institutions. The ranking has seven indicators and assesses teaching quality, graduate employability, faculty quality and research performance. With databases that are independent of university feedback, its evaluation criteria are based on academic

Ranking	Year of creation	Brief description
		awards, such as Nobel and Fields Medals, and prominent positions in companies, such as president or CEO. The bibliometric analysis uses data from the American company Clarivate Analytics (Dolcimasculo, 2020).
Folha University Ranking (RUF)	2012	Created by the leading Brazilian newspaper Folha de S. Paulo, it is a national evaluation of all active Brazilian universities (EGIDA/USP, 2024).
General Course Index (IGC)	2014	This is a tool developed by the Ministry of Education (MEC) that synthesizes the quality of all undergraduate and graduate courses at a Brazilian higher education institution into a single indicator. Together with the Preliminary Course Concept (CPC), the National Student Performance Exam (Enade), and the Indicator of Difference between Observed and Expected Performance (IDD), they comprise the set of procedures and assessment tools provided for by the law of the National Higher Education Assessment System (Sinaes) – Law No. 10861, of April 14, 2014 (INEP, 2024).
Global University Visibility Rankings (GUV)	2018	Ranking organized annually by the American consulting firm in the field of higher education American Caldwell, measures the global visibility of over 1,000 colleges and universities around the world. It serves as a measure of institutional prominence, university brand strength and public recognition in higher education (American Caldwell, 2025). The GUV ranking uses a methodology to score university brand strength in a given year, measuring how effectively each institution communicates its story to the world. The brand visibility score is calculated based on seven key performance indicators, tracked by the ranking organization team, each weighted at different levels (American Caldwell, 2025).
College Guide	2019	Created by the leading Brazilian newspaper Estado de S. Paulo (also known as Estadão), it is the result of a partnership with Quero Educação, one of the leading startups in the Brazilian education sector. Participation by higher education institutions is voluntary, requiring registration and completion of a questionnaire, as are the more than 6,000 coordinators and professors in Brazilian higher education who register to serve as evaluators on a voluntary and unpaid basis. As a priority, the evaluation by these volunteers will consider courses in their areas of expertise and institutions located in the same region of Brazil where they work (Estadão, 2024).

Source: author.

Often referred to as the "Big Three", the ARWU, THEWUR and QS rankings are frequently cited by university leaders, industry and government policymakers. The Big Three offer a variety of derivative products, including regional rankings, consulting services and software designed to help university leaders hire and make decisions that can improve their institution's ranking (Hazelkorn, 2015).

According to Bazhenkov *et al.* (2023), the popularity of rankings in the media and public attention to their indicators contribute to the fact that universities in the top rankings are perceived by society as more suitable institutions because they align with modern and

progressive trends. In Brazil, a study conducted by Alves *et al.* (2023) with 54 Brazilian universities concluded that there is a tendency to institutionalize rankings as a management and strategic planning tool. Some universities have demonstrated a critical view, recognizing rankings as useful tools, but not as ends in themselves. Ganga-Contreras *et al.* (2023) confirm this understanding and believe that rankings have value as instruments of accountability and for improvements in higher education, as long as they are not adopted as the sole criterion for evaluation.

Dolcimasculo (2020) selected five of these global rankings to compare them with the characteristics inherent to entrepreneurial universities that she gathered from the literature (see subsection [3.2.3](#)) and concluded that:

- U-Multirank: came closest to the concept of an entrepreneurial university, with 74% of its indicators related to the identified characteristics.
- QS: 67% of the indicators were related, but with a focus on reputation and employability.
- THE: 46% of related indicators.
- RUR: 35% of related indicators.
- CWUR: 29% of related indicators.

University rankings focused more specifically on entrepreneurship will be presented in subsection [3.3.3 "Means of Evaluating the Entrepreneurial Performance of HEIs"](#), as a result of the Systematic Literature Review.

3.3.2 Criticisms of ranking systems

“There is considerable criticism of the methodology, the choice and weighting of indicators, the quality of data and its reliability as an international or institutional performance comparator, and whether it is possible to measure and compare complex and diverse HEIs, which have different missions and contexts” (Hazelkorn, 2013).

Although there is no consensus on the concept of teaching quality in methodological terms (Ganga-Contreras *et al.*, 2023; Righetti, 2019), rankings function as signs of quality in a scenario of asymmetric information. However, they are reductionists and favor a single model

of elite research universities. Their use can intensify the stratification of the higher education system, promoting institutional isomorphism and marginalizing alternative university models (Fanelli & Carranza, 2018). Stack (2021) and Sponsler (2009) suggest taking advantage of the public attention that rankings receive to promote debates on educational quality and equity, redefining indicators that value inclusion and diversity.

Rankings are problematic, and many of the metrics they use are arbitrarily weighted and are not accurate indicators of an institution's quality or positive outcomes for students. An institution's selectivity is not a reliable predictor of student well-being, learning or future job satisfaction (...). Individual student characteristics (such as ambition, background and field of academic specialization) make more of a difference than the institutions themselves in terms of post-higher education outcomes (Challenge Success, 2018).

Rankings also have an impact on individual and institutional well-being: Stack (2021) states that they affect the mental health of faculty and students, generating anxiety and feelings of inadequacy. Less prestigious institutions face greater pressure to conform to ranking criteria, even if this compromises their social mission.

According to studies conducted by the non-profit group Challenge Success (2018), affiliated with Stanford University's School of Education, each metric used by each ranking appears to have been carefully selected. However, the weight given to each metric when calculating the overall score is artificially precise, raising several questions such as: based on what standards are these weights evaluated? On other ranking systems? On results from previous years? Are they adjusted year by year to ensure some changes in the rankings? For researchers from this group, ranking systems often use data that is "easy to collect", not necessarily the most relevant data, so that "there is no objective way to decide whether the rankings produced by this selection of metrics and this weighting are accurate and meaningful".

Stack (2021) points out that the influence of the American model on international ranking methodologies is undeniable. The systems favor indicators that are characteristic or even unique to the context of the United States, such as the number of publications in English-language journals or the level of patent production by universities. This favors not only English speakers but also researchers in the exact sciences, given that most journals are in these areas.

China created the C9 League and injected US\$1.86 billion to compete with American Ivy League universities (namely Brown, Columbia, Cornell, Dartmouth, Harvard, Pennsylvania,

Princeton and Yale). Russia allocates US\$152 million per student to study at a university ranked among the top 200 worldwide. India partners with only universities in the top 500 for joint degree programs (Taylor *et al.*, 2014). While such efforts by the Chinese and Indian governments to climb the university rankings appear to be showing results, both countries have cracked down on academic freedom (Scholars at Risk, 2001). Countries with several top-ranked universities, including the United States, have also been criticized for infringing on academic freedom (Scholars at Risk, 2019).

Hazelkorn (2008 and 2009) states that institutions are adapting their strategies to improve their positions in the rankings, which includes mergers, the creation of research centers, a focus on publications in English, and prioritizing scientific areas with greater visibility in the rankings. This pressure for performance has generated side effects, such as the devaluation of the humanities.

As a result, many governments – such as Brazil – have prioritized programs in the areas of STEM (Science, Technology, Engineering and Mathematics), whose results are more visible on a global scale. Between 2012 and 2017, the Brazilian government invested more than US\$3.5 billion in the “Science Without Borders” program to send more than 100,000 STEM students abroad to study at top-ranked universities (mostly American) (Caldeira, 2017; Righetti, 2016). In Japan, in 2015, twenty-six universities (out of sixty) announced plans to close or reduce their social sciences and humanities departments, arguing that there were areas better suited to meeting the needs of society (Grove, 2015).

The ranking paradigm has faced significant resistance and questions regarding the neutrality of the systems and their enormous role in imposing policies in areas ranging from higher education to immigration (Ambrus, 2012). As pointed out by Stack (2021), highly ranked HEIs tend to attract international scholars, an indicator that is reflected in QS and THE rankings. According to Calderón, Wandercil and Martins (2019), rankings encourage the creation of “world-class universities”, especially in Asia (China, Malaysia, South Korea). In Taiwan, educational reforms have increased the pressure for international publications, affecting the local relevance of research. Hazelkorn (2009) warns that there is a risk of distortions in scientific and educational policy, with resources concentrated in a few universities and the marginalization of other forms of knowledge production. Among the impacts on knowledge production caused by

rankings is the pressure for publications in high-impact journals, which leads to the dominance of large academic publishers and makes access to knowledge more expensive (Stack, 2021).

Regarding government funding strategies, performance-based systems are common in countries such as the United Kingdom, Spain, Australia and Japan (Calderón, Wandercil and Martins, 2019). To improve the classification of the highest-ranked universities, it is these institutions that receive investment. This results in rules of the game that favor previous winners, increasing their power and prestige, something that sociology calls the “Matthew Effect”: those who start with an advantage accumulate more advantage over time (Stack, 2021). Ganga-Contreras *et al.* (2023) and Calderón, Wandercil and Martins (2019) agree that rankings tend to reinforce inequalities between institutions.

Rankings have introduced new and external measures of academic hierarchy. This change has profound implications, including the loss of autonomy of individual institutions and higher education systems and a trend toward the homogenization of priorities and goals, causing a deviation from the institutional mission in pursuit of better positioning (Stack, 2021; Calderón, Wandercil and Martins, 2019; Ganga-Contreras *et al.*, 2023). Decuyper & Landri (2021) argue that rankings such as ARWU and THE oversimplify educational processes, favor research-intensive and English-speaking universities, reinforce competition and hierarchies between institutions and countries, and promote a neoliberal culture of auditing and commodification of higher education.

Hazelkorn (2013) discussed whether higher education policies should focus on creating world-class universities or world-class higher education systems. Her research identified two policy models:

- Neoliberal model: seeks to concentrate resources on a small number of elite or world-class universities. This is often referred to as the “Harvard-here” model, as it aims to replicate the Harvard University experience by encouraging greater vertical or hierarchical (reputational) differentiation between HEIs, with a sharper distinction between research (elite) universities and teaching (mass) institutions. The allocation of resources may be linked to institutional profile or other ranking-based classification tools; and

- Social democratic model: seeks to balance excellence and equity by supporting the development of a world-class higher education system across the country. This should be achieved by strengthening horizontal differentiation (by mission or function) in a diverse portfolio of high-performing HEIs, some of which may have a global or regional focus. The emphasis is on supporting excellence wherever it occurs, encouraging HEIs to specialize in specific disciplines or domains of knowledge, according to their expertise, competence, demand and/or mission. There is a strong emphasis on the close correlation between teaching and research, as well as on the production, commercialization and dissemination of knowledge as components of an integrated process.

The author concluded that “the challenge is to balance excellence in global science with a world-class higher education system – accessible to as many people as possible – rather than simply building world-class institutions” (Hazelkorn, 2013).

Ranking methodologies are steeped in the norms and values of dominant cultures. The cult of meritocracy is central to these values, in which results are confused with intrinsic value (Marginson, 2016). Calderón *et al.* (2023) criticize the emphasis on metrics at the expense of broader educational values and argue that internationalization and academic excellence are goals, but require sustained investment, management reforms and international collaboration.

Countries in the Global South face difficulties in competing, which reinforces historical and epistemological inequalities. In Latin America, there is resistance to the use of rankings as an assessment tool, especially in countries with a tradition of free public education (Stack, 2021). Darwin & Barahona (2023) analyzed 57 studies published between 2013 and 2023 to identify the impact of regionalized global university rankings in Latin America. The authors argue that rankings tend to favor criteria aligned with Global North standards and encourage publications in English, promoting an elitist and internationalized view of the university, which can distort the social and democratic mission of Latin American institutions and render local knowledge invisible or delegitimize it.

Unlike global rankings, which are mainly oriented toward evaluating scientific output and are therefore more restrictive, local rankings tend to evaluate educational function (teaching, infrastructure and local reputation), representing alternatives that are more appropriate to the

context, missions and realities of each HEI (Bazhenkov *et al.*, 2023; Righetti, 2019; Kochetkov, Larionova and Vukovic, 2017).

Darwin & Barahona (2023) agree that national rankings (such as those in Brazil, Mexico and Chile) focus on aspects that are more relevant to students in Latin America, such as employability and teaching quality, and offer alternatives that are more appropriate to the context of the region in which these HEIs are located. Although global rankings are becoming a hegemonic force, shaping university policies and practices, and should not be ignored, it is essential to develop forms of evaluation that respect regional specificities to balance the tension between adopting global standards and preserving local diversity and relevance (Ganga-Contreras *et al.*, 2023).

Calderón, Wandercil and Martins (2019) corroborate this point and advocate for the use of rankings as tools for guidance and continuous improvement, not just as instruments of competition. In addition, they recommend creating national rankings that consider the reality of each country and local development goals to promote equity. Similarly, Ganga-Contreras *et al.* (2023) recommend improving rankings with more diverse and contextualized indicators, respecting the missions and realities of each institution. Stack (2021) also proposes more inclusive assessment models that consider teaching, community engagement and epistemological diversity.

3.3.3 Means of evaluating the entrepreneurial performance of HEIs

3.3.3.1 National University Rankings

Compiled by the American non-profit bimonthly magazine Washington Monthly since 2005, it exclusively ranks American universities that offer bachelor's degrees in the arts and sciences, rather than professional programs. This ranking considers what the university does for the United States in terms of contributing to the public good in three equally weighted dimensions: social mobility; research; and community and national service. This means that the highest-ranked colleges needed to excel across the breadth of dimensions, rather than excelling in just one (Washington Monthly, 2025).

The 2024 edition of the ranking ranked more than 1,440 American public, private, nonprofit and for-profit colleges. To ensure that each measurement contributed equally to a college's score in any dimension, each data element was standardized so that each had a mean of zero and a standard deviation of one (unless otherwise indicated). The data was adjusted to account for statistical outliers, allowing no college's performance in any single area to exceed five standard deviations from the dataset average. All measures (unless otherwise indicated) use an average of the most recent three years of data to obtain a better picture of a college's performance rather than statistical noise (Washington Monthly, 2024).

The methodology for this ranking is presented in Chart 21.

Chart 21. Methodology of the National University Rankings (reference year: 2024)

Dimension	Indicator	Weight/Point
Social mobility	Graduation rate over the last 8 years	10%
	Expected graduation rate based on the average percentage of Pell Grant recipients (federal program for financial aid to students with exceptional financial needs) over the last 3 years	10%
	Graduation difference between Pell Grant recipients and non-recipients (colleges that had higher Pell graduation rates than non-Pell received a positive score on this indicator)	10%
	Graduation gap for Pell Grant recipients	10%
	Number of Pell Grant recipients who graduated (bachelor's degrees)	10%
	Actual Pell Grant recipient enrollment vs. projected enrollment	10%
	Student earnings 9 years after entering college	10%
	Projected student earnings	10%
Research	Average net prices paid over the last 3 years by first-year full-time students in the state, with family incomes below \$75,000 per year	20%
	Total research expenditure, in millions of dollars	20%
	Number of PhDs in science and engineering awarded by the university (*For liberal arts colleges and institutions offering only master's and/or bachelor's degrees, PhDs in science and engineering were excluded, and double weight was given to the number of alumni who go on to earn PhDs)	20%
	Number of undergraduate alumni who went on to earn a PhD in any subject, relative to the size of the college	20%
	Number of faculty receiving prestigious awards, relative to the number of full-time faculty members	20%
Community and national service	Number of faculty members in the National Academies (Air Force, Army, Coast Guard, Merchant Marine and Navy), relative to the number of full-time faculty members	20%
	Data from U.S. federal agencies for national service and volunteering AmeriCorps/Peace Corps (3-year moving average) – Examples: number of alumni currently serving in the Peace Corps relative to total enrollment; number of students who received a Segal AmeriCorps award for completing national service (two points)	Standardized indicators using a 3-year moving average
	Size of Air Force Reserve Officer Training Corps, Army Reserve Officer Training Corps, and Navy Reserve Officer Training Corps programs at each college relative to the number of students (3-year moving average)	
Percentage of federal work-study grant money spent on community service projects (3-year moving average, according to data provided by the Corporation for National and Community Service)		

Dimension	Indicator	Weight/Point
	Did the IES receive the Carnegie Community Engagement Classification? This classification rewards colleges that provide documentation of their institutional mission and broader public engagement.	Classified IES receives two points
	Voting engagement, using data from Tufts University's National Study of Learning, Voting and Engagement (NSLVE) and the nonprofit ALL IN Campus Democracy Challenge. IES can receive one point for making their NSLVE-ALL IN survey data publicly available in 2020. They can receive one point for creating an action plan through ALL IN in 2024 and an additional point for being a signatory (meaning that the presidents/deans of these IES have signed the so-called "Presidents' Pledge" and committed to 100% student voter registration and turnout). HEIs also earn one point if they had a student voter registration rate above 85% in 2020.	HEIs can earn up to four points for meeting each of the four criteria
	Percentage of all degrees awarded in health, education and social work	Not reported

Source: adapted from Washington Monthly (2025).

3.3.3.2 Top Schools for Entrepreneurship

Princeton Review is an educational services company that has been ranking the Top Schools for Entrepreneurship annually since 2006 (see Chart 22), in partnership with Entrepreneur magazine. It consists of two surveys: one with graduate schools and colleges, and another with undergraduate schools and colleges, totaling more than 300 institutions ranked according to the entrepreneurial study opportunities they offer. To publish the results the following year, surveys are conducted at the institutions between June and August of the current year (Princeton Review, 2025).

Chart 22. Methodology of the Top Schools for Entrepreneurship ranking (reference year: 2025)

Dimension	Indicator
Academics and requirements	Does the HEI offer a specialization or undergraduate program in entrepreneurship?
	Does the HEI offer an entrepreneurship center where students can engage in the study and/or practice of entrepreneurship?
	Does the HEI offer entrepreneurship courses?
	Course options offered at the HEI: <ul style="list-style-type: none"> ▪ Corporate Entrepreneurship ▪ Business Finance ▪ Business Law ▪ Entrepreneurial Leadership ▪ Entrepreneurial Management ▪ Entrepreneurial Marketing ▪ Entrepreneurial Operations ▪ Entrepreneurial Strategy ▪ Entrepreneurship in healthcare ▪ Family Business ▪ Feasibility Analysis ▪ Franchising ▪ International Entrepreneurship ▪ Introduction to Entrepreneurship ▪ Introduction to New Business Ventures ▪ New Product Development ▪ Financing New Ventures ▪ Management of New Ventures

Dimension	Indicator
	<ul style="list-style-type: none"> ▪ Social Entrepreneurship ▪ Technology Commercialization ▪ Technological Feasibility ▪ Venture Capital and Private Equity
	Do entrepreneurship offerings employ a team-oriented approach in at least one course focused on entrepreneurship, where teams are composed of students from diverse disciplines and programs? (e.g., entrepreneurship students work with STEM students to develop ideas or products)
	In total, how many entrepreneurship-related courses does the HEI offer?
Students and Faculty	What is the total enrollment (full-time and part-time) in the institution's entrepreneurship offerings for the 2023-2024 academic year?
	What percentage of the total student body (full-time and part-time degree-seeking) was enrolled in an entrepreneurship offering for the 2023-2024 academic year?
	How many undergraduate programs are represented by students in your undergraduate entrepreneurship offerings for the 2023-2024 academic year?
	Total number of faculty (full-time, part-time or adjunct) teaching at least one entrepreneurship course during the 2023-2024 academic year
	Number of departments represented by entrepreneurship faculty
	What is the total percentage of entrepreneurship faculty at the HEI who have started, purchased or managed a business?
Alumni ventures	Total number of companies started by graduates in the last five years: <ul style="list-style-type: none"> ▪ The total amount, in dollars, of funding these companies have risen. ▪ Of the companies created by graduates in the last five years, what percentage are still in operation?
	Total number of companies started by graduates in the last ten years: <ul style="list-style-type: none"> ▪ The total amount, in dollars, of funding these companies have risen. ▪ Of the companies created by graduates in the last ten years, what percentage are still in business?
Outside the classroom	During the 2023–2024 academic year, did the HEI offer at least one officially sponsored program where students are mentored by individuals outside the university? (e.g., ongoing active contact working on a project in person or online or through a course)
	During the 2023–2024 academic year, how many individual mentors worked with students through an officially sponsored school program?
Competitions organized by the IES	Did the IES host any of the following programs in the 2023–2024 academic year? <ul style="list-style-type: none"> ▪ Business Plan Competition ▪ New Venture Competition ▪ Hacking marathon ▪ Shark Tank-inspired competition ▪ Startup weekend ▪ Pitch deck competition ▪ Business Model Canvas contest ▪ App or game development competition
	If the HEI hosted any of these competitions, what was the total amount of cash prizes awarded?
	If the HEI hosted any of these competitions, what was the total cash value of the cash prizes awarded?
	During the 2023–2024 academic year, what was the total amount, in dollars, of prizes won by students enrolled in entrepreneurship offerings in competitions at your institution?
	During the 2023–2024 academic year, what was the total cash value of prizes won in competitions by students enrolled in entrepreneurship offerings at your institution?
Scholarships and grants	Does the HEI offer at least one scholarship specifically for the study of entrepreneurship?
	If so, what is the total amount, in dollars, available?
	Total number of individual scholarships/grants awarded
	Average dollar amount of individual awards

Source: adapted from Princeton Review (2025).

3.3.3.3 America's Top Colleges

Since 2008, Forbes magazine's America's Top Colleges ranking has ranked the 500 American HEIs that produce “successful, well-paid and influential graduates from all economic backgrounds, with less student debt” (Forbes, 2024). What sets this ranking apart from others is that the list of American leaders produced by Forbes is considered one of the dimensions of the methodology, which is presented in Chart 23.

Chart 23. Methodology of the America's Top Colleges ranking (reference year: 2024)

Dimension	Description / Indicators	Weight
Alumni Salary	<p>Earnings data from Payscale and the College Scorecard are used to determine which colleges produced the highest-paid graduates. Payscale data shows the average earnings of graduates six and ten years after graduation. College Scorecard provides data on the average earnings of graduates six and ten years after their first enrollment at an institution. Each of the four income segments is weighted at 5%.</p> <p>It should be noted that Payscale relies on self-reported survey data, which can result in skewed information – graduates who are employed and happy with their earnings may be more likely to respond. College Scorecard, on the other hand, collects information only for those with federal student loans – not for all graduates.</p>	20%
Debt	<p>Data obtained from College Scorecard:</p> <ul style="list-style-type: none"> ▪ Debt index and percentage borrowed (7.5%): multiplication of the average federal loan debt per borrower by the percentage of students who take out federal student loans at the IES; and ▪ Five-year repayment rate for each institution (7.5%): percentage of graduates who paid at least \$1 toward the principal of their federal loan within five years of beginning repayment. 	15%
Graduation rate	<p>The six-year graduation rate of HEIs is considered to account for the results of transfer students, part-time students and other students who take leave for financial, health or other reasons (10%). The other 5% is based on graduation rates for Pell Grant recipients, which are aimed at low-income students. The Pell graduation rate is weighted by the proportion of Pell recipients at each institution to reward HEIs for enrolling and graduating a higher proportion of low-income students.</p>	15%
Forbes List of American Leaders	<p>The Forbes List of American Leaders aims to assess the leadership and entrepreneurial success of an institution's graduates. To do so, it counts how many list makers each institution has produced in the most recent Forbes 30 Under 30, Forbes 400 Richest Americans, Richest Self-Made Women and Most Powerful Women lists. It also counts the undergraduate <i>alma maters</i> of members of the current Cabinet, Supreme Court, Congress and sitting governors, as well as the most recent winners of MacArthur ("Genius Grant") and Guggenheim Fellowships, Presidential Medals, Fields Medals, Nobel Prizes, Pulitzer Prizes, Oscars, Tony Awards, Breakthrough Prizes, Lasker Awards and others.</p>	15%
Return on investment	<p>The Third Way, an American think tank, produces a price-earnings ratio for each HEI, calculated by dividing the total net price of obtaining a university degree by the increase in post-enrollment earnings that students obtain compared to the typical salary of a high school graduate in their state. This variable is weighted at 10%. This indicator also considers a price-earnings ratio for low-income students, weighted at 5%.</p>	15%

Dimension	Description / Indicators	Weight
Retention rate	To account for student satisfaction, a three-year average retention rate is calculated using data from the Integrated Postsecondary Education Data System, which measures the percentage of students who choose to stay after their first year. The three most recent years are extracted for this measure, but as the COVID-19 pandemic caused widespread disruptions and postponements, it was decided to exclude the year 2020 from this measure. Thus, for the 2024 list, an average of the retention rates in 2019, 2021 and 2022 was obtained.	10%
Academic success	Data obtained from the National Center for Science and Engineering Statistics: <ul style="list-style-type: none"> ▪ Number of recent graduates from each college who won Fulbright, Truman, Goldwater and Rhodes scholarships (5%); and ▪ Average number of alumni from a given college who obtained a PhD in the last three years (5%), weighted by IES enrollment. 	10%

Source: adapted from Forbes (2024).

There was also the Startup Schools ranking, from the same magazine, which was discontinued in 2015 and ranked the 50 most entrepreneurial research universities in the United States based on what the magazine calls entrepreneurship indices: the number of alumni and students who identified themselves as founders and owners of companies on the LinkedIn social network in relation to the total student body of the HEI (undergraduate and graduate combined) (Forbes, 2015).

3.3.3.4 Entrepreneurial and Innovative Universities Index (EIUI)

Developed by the Scientific and Technological Research Council of Turkey (TÜBİTAK) since 2012, the Entrepreneurial and Innovative University Index (EIUI) ranks the top 50 Turkish universities out of 208 based on their scientific and technological research capabilities, intellectual property, cooperation and interaction, entrepreneurial and innovative culture, economic contribution, and commercialization.

This ranking seeks to increase competitiveness among Turkish universities through entrepreneurship and innovation and to contribute to the development of the entrepreneurial and innovative ecosystem in that country (IGI Global, 2025; Eleveli & Eleveli, 2024).

According to Eleveli & Eleveli (2024), the EIUI underwent changes in 2018, when it began to evaluate aspects under four dimensions, rather than five, as shown in Chart 24. The composite indicator of the weighting of four dimensions and 23 indicators is calculated from data collected from public records, the universities themselves and technology parks. Thus, the scientific activities of universities and industrial collaborations are considered simultaneously.

Chart 24. Methodology of the Entrepreneurial and Innovative Universities Index (EIUI)

Dimension	Description	Criteria (subdimension)	Weight
D1 (15%)	Scientific and technological research capabilities	Number of scientific articles	2.5%
		Number of citations	3.5%
		Number of projects	2%
		Amount of project funds	3%
		Number of national and international scientific awards	1.5%
		Number of PhD graduates	2.5%
D2 (20%)	Intellectual property pool	Number of national patent grants	5.2%
		Number of utility model grants	3%
		Number of international patent applications	5%
		Number of international patent grants	6.8%
D3 (25%)	Cooperation and interaction	Number of collaborative projects with industry	5%
		Amount of funds for collaborative projects with industry	6%
		Number of international collaboration projects	5%
		Amount of funds for international collaboration projects	6%
		Number of academics/students in circulation	1.44%
		Number of students enrolled in the industry PhD program	1.56%
D4 (40%)	Economic and social contribution	Number of companies founded by academics	5.68%
		Number of companies founded by students/graduates	7.57%
		Net sales revenue of companies founded by academics	7.57%
		Net sales revenue of companies founded by students/graduates	10.41%
		Number of patents/utility models/industrial designs licensed	3.78%
		Number of BİGG companies (TUBITAK 1512 Entrepreneurship Support Program) ¹	3%
		Number of projects 4004 (Nature Education and Science Schools) and 4005 (TUBITAK Innovative Educational Practices) ²	2%

¹ TÜBİTAK program that aims to support activities from the initial phase to the market, so that entrepreneurs can transform their technology and innovation-oriented business ideas into ventures with high added value and high potential for creating skilled jobs. In this way, it seeks to encourage qualified entrepreneurship and create startup companies that have international competitive power and can develop innovative, high-tech products and services (TÜBİTAK, 2025).

² Public Calls offered by TÜBİTAK: (i) Program 4004 – Support for Nature Education and Science Schools aims to carry out scientific activities for different segments of society, from preschool children to undergraduate students and teachers, and (ii) Program 4005 – Support for Innovative Educational Practices aims to provide innovative approaches, strategies, methods and techniques specific to their own fields and to the teaching profession in general, in an interactive manner (TÜBİTAK, 2018).

Source: adapted from Elevli & Elevli (2024, p. 8).

3.3.3.5 Guiding Framework for Entrepreneurial Universities

A guide prepared by the Organization for Economic Cooperation and Development (OECD) and published in December 2012 breaks down the recommended practices for European HEIs interested in self-assessing themselves in relation to factors that characterize entrepreneurial

universities into seven dimensions (OECD, 2012). Each dimension described in Chart 25 is represented by a set of statements, to which the institution must respond according to the degree of agreement/compliance, which ranges from zero to ten.

Chart 25. Dimensions of entrepreneurial universities according to the OECD

Dimension	Description
Leadership and governance	Explores factors related to the leadership and governance of a university. To develop an entrepreneurial culture in an HEI, it is essential to have strong leadership and good governance. Many universities include the words “entrepreneurship” in their mission statements, but this needs to be more than just a reference.
Organizational capacity, people and incentives	HEIs can be limited by their own organizational structures and approaches, which makes it more difficult to carry out the types of entrepreneurial activities that support their strategic objectives. To minimize organizational constraints and fulfill their entrepreneurial agenda, HEIs should address the following key issues: financial strategy, attracting and retaining the right people, and creating incentives for entrepreneurial behavior among individuals in the organizational system.
Developing entrepreneurship in teaching and learning	HEIs should expand their offering of entrepreneurship and entrepreneurial education to the entire institution, including staff (faculty and technical) and students. The organizational structure should support this entrepreneurial development and provide the appropriate tools to offer education and training opportunities both internally and through the external environment.
Pathways for entrepreneurs	The decision to commit to entrepreneurship is not a single act, but rather a process. For universities to be entrepreneurial, they need to support the paths taken by potential entrepreneurs (faculty, technical staff and students), from the conception of ideas to growth in the market or entry into the job market. This process does not only take place internally at the university, but requires a pluralistic approach, offering access to internal and external opportunities and expertise.
University-business and other external relationships for knowledge exchange	The active involvement of stakeholders is a factor that contributes to the success of entrepreneurial universities. Building and maintaining relationships with key partners and collaborators is essential for HEIs to reach their full potential, whether in entrepreneurship in research, teaching or other third mission activities. The external environment has several components, including relationships with the public sector, regions, companies, alumni, professional entities, among others. The motivation for this commitment is to create value for both the university and society.
The entrepreneurial university as an internationalized institution	An international perspective at all levels is one of the characteristics of an entrepreneurial university. As internationalization becomes more integrated into strategic processes, it becomes essential for HEIs to be able to make informed decisions about institutional direction, as well as to evaluate and improve performance according to different objectives in a wide range of international activities. It is not possible for a university to be entrepreneurial without being international, although it can be international without being entrepreneurial. The international environment influences the entrepreneurial aspects of teaching, research, talent development, new opportunities and culture.
Measuring the impact of the entrepreneurial university	There are several types of impact that a university can pursue, ranging from local to global. These impacts affect internal stakeholders (students, graduates, faculty and technical staff) as well as external stakeholders (local businesses, organizations and communities). Impact measurement in HEIs is still underdeveloped. Most of the metrics found in the literature are related to spin-offs, intellectual property and research results, rather than entrepreneurship among graduates, talent retention, local economic development or the impacts of a broader entrepreneurial strategy.

Source: adapted from OECD (2012).

3.3.3.6 HEInnovate

Developed in 2013 from a partnership between the OECD and the European Commission – a politically independent institution that represents and defends the interests of the European Union as a whole. Its goal is to support HEIs in empowering students and faculty to demonstrate entrepreneurship, innovation and creativity in their teaching, research and outreach missions (OECD, 2025). It is a tool for HEIs to self-assess by responding to statements on a scale ranging from “no data available to respond” to the degree of agreement/compliance, which varies from one to five. For each dimension described in Chart 26, there is a set of statements. The statements for each dimension and the respective examples of good practices are listed in [Annex C](#).

HEInnovate is not a benchmarking tool: it guides all types of HEIs through a process of identifying, prioritizing and planning actions in eight main areas, with 38 statements to be answered by the institution. It diagnoses areas of strength and weakness, opens discussions about the entrepreneurial/innovative nature of the institution and allows for comparison and contrast of evolution over time. Access to results, learning materials and a group of experts is instantaneous. It is free, confidential and open (HEInnovate, 2025).

Chart 26. Methodology of the HEInnovate self-assessment tool

Dimension	Description
Leadership and governance	Entrepreneurial leadership and responsible governance are crucial for developing an entrepreneurial and innovative culture within an HEI. Such leadership defines entrepreneurship as a strategic priority and takes entrepreneurial and innovative practices from one-off experiments to an integrated approach that is essential to how the HEI conducts teaching, research and knowledge exchange.
Organizational capacity: people, resources, incentives and rewards	An HEI's organizational capacity drives its ability to deliver its entrepreneurial strategy. If an HEI is committed to undertaking entrepreneurial activities to support its strategic objectives, then key resources such as people, funding and investments, expertise and knowledge, reward and incentive systems need to be in place to sustain and increase its capacity for entrepreneurship and innovation.
Entrepreneurship teaching and learning	Entrepreneurial teaching and learning involve exploring flexible pedagogies, practices and learning pathways to foster entrepreneurial mindsets in an inclusive and sustainable manner.
	HEIs can help students, graduates and staff consider starting a business as a career option. At the outset, it is important to help individuals reflect on the commercial, social,

Dimension	Description
Preparing and supporting entrepreneurs	environmental and lifestyle goals related to their entrepreneurial aspirations and intentions. For those who decide to proceed with starting a business or other type of venture, targeted assistance can be offered to generate, evaluate and act on the idea, develop the skills necessary for successful entrepreneurship, and, most importantly, find relevant team members and gain access to appropriate financing and effective networks. In offering this support, an HEI should ideally act as part of a broader business support ecosystem rather than operating in isolation.
Digital transformation and capacity	HEIs are already implementing digital technologies, but acceptance and integration vary between and within institutions. HEIs should take full advantage of the opportunities presented by digital transformation and consider digital technologies as an essential enabler of innovation and entrepreneurship. The digital capacity of an HEI is defined as the ability to integrate, optimize and transform digital technologies to support innovation and entrepreneurship.
Entrepreneurial ecosystem and networks	An entrepreneurial and innovative HEI proactively connects with its ecosystem (intended as a matrix of interconnected actors bringing together skills and resources to pursue a common goal) to deliver social, cultural and economic benefits. The ability to connect with entrepreneurial ecosystems and networks is an important catalyst for organizational innovation in HEIs. It also helps advance teaching and research, and transforms HEIs into important actors in regional development and issues related to territorial cohesion.
Internationalized institution	A sustainable entrepreneurial HEI integrates internationalization into the design and delivery of education, research and knowledge exchange by introducing new issues, approaches and alternative ways of thinking. By considering international social challenges, including the UN SDGs, an entrepreneurial HEI is also better equipped to support its ecosystem.
Impact of the Entrepreneurial HEI	The entrepreneurial HEI combines institutional self-awareness, external reflection and an evidence-based approach. An HEI that monitors the impact of all activities connected to the entrepreneurial and innovation agenda generates valuable information and data to be used to improve its own performance. Metrics should go beyond the creation of spin-offs to include the volume and quality of intellectual property generation and research income generation. Assessment activities should also focus on graduate entrepreneurship, skills and competency development, teaching and learning outcomes, talent retention, contribution to global, national, and local economic development, or the impact of the institution's broader entrepreneurial agenda.

Source: adapted from HEInnovate (2025).

3.3.3.7 World's Most Innovative Universities

The World's Most Innovative Universities ranking has been published annually since 2015 by Thomson Reuters. Kochetkov, Larionova and Vukovic (2017) state that it represents an intermediate alternative between the academic and business rankings of universities. Its methodology is presented in Chart 27.

Chart 27. Methodology of the World's Most Innovative Universities ranking

Indicator	Description	Sources of information
Volume of patents	The number of basic patents (patent families) registered by HEIs. This is an indication of research output that has commercial potential. The number is	Derwent World Patents Index, Derwent Innovations Index

Indicator	Description	Sources of information
	limited to patents registered with the World Intellectual Property Organization (WIPO).	
Patent success	The ratio of patent applications to grants over the period evaluated. This indicates the university's success in registering applications that are then accepted.	Derwent World Patents Index, Derwent Innovations Index
Global patents	The percentage of patents for which coverage has been sought with the patent offices of the United States, Europe and Japan. Registering an international patent is an expensive and laborious process, and registration in multiple countries or regions is an indication that the invention is considered non-trivial and has commercial value.	Derwent World Patents Index, Derwent Innovations Index
Patent citations	The total number of times a patent has been cited by other patents. As part of the patent examination process, the patent office examiner will cite significant prior art. The number of times a patent has been cited is an indication that it has an impact on other commercial research and development.	Patent Citation Index
Patent Citation Impact	An indication of how much impact a patent has had. As it is a ratio (or average), it does not depend on the size of the HEI. Note that the indicator "Percentage of cited patents" (listed below) is closely related to this indicator, so these two indicators receive half the weight of all others.	Patent Citation Index
Percentage of patents cited	Proportion of patents that have been cited by other patents one or more times. As mentioned, it is closely linked to the "Impact of patent citation" indicator.	Patent Citation Index
Patent Citation Impact for Article	Like "Patent Citation Impact", this indicator measures the average number of times a journal article has been cited by patents. It demonstrates that basic research conducted in an academic setting (as recorded in academic articles) has had an influence and impact on commercial research and development (as measured by patents).	Patent Citation Index, Derwent World Patents Index, Web of Science Core Collection
Impact of industry article citations	Article-to-article citations are an established indicator of research influence and impact. By limiting citing articles to those from industry only, this indicator reveals the influence and impact that basic research conducted in an academic environment has had on commercial research.	Web of Science Core Collection
Percentage of collaborative articles from industry	The percentage of all articles from a university that contain one or more co-authors from a commercial entity. This indicator shows the percentage of research activity that is conducted in collaboration with industry, suggesting the potential future economic impact of the joint research project.	Web of Science Core Collection
Total articles in the Web of Science Core Collection	The total number of journal articles published by the HEI. This is a measure dependent on the size of the university's research output.	Web of Science Core Collection

Source: adapted from Reuters (2025).

3.3.3.8 PitchBook Universities

The American company Pitchbook is a database of venture capital, private equity, mergers and acquisitions. This platform provides detailed information on millions of companies, businesses, investors and investments, based on the analysis of raw data to provide context and practical insights for its clients. Since 2015, Pitchbook has published annual university reports and rankings that compare HEIs worldwide by counting the number of entrepreneurial alumni who have raised venture capital in the last decade. The rankings are based on the company's own data on global venture capital investment and an analysis of nearly 167,000 venture capital-backed founders (Pitchbook, 2024).

The 2024 ranking is based on the total number of founders whose companies received a round of venture capital funding between January 1, 2013, and August 1, 2024. Since companies may have more than one founder, and founders may attend multiple HEIs, it is possible for the same company or founder to be counted for multiple universities. The graduate category includes all founders who have an advanced degree, including a Master of Business Administration (MBA). The MBA category includes only founders with an MBA from that institution (Pitchbook, 2024).

In addition to the division by undergraduate, graduate and MBA programs, Pitchbook published additional lists for European universities and an edition of female founders in 2023 and 2024 (Pitchbook, 2024). In the top 100 ranking, in addition to the criteria of founder count and company count, the amount of capital raised, the number of students enrolled, the geographic scope and whether the HEI is public or private are also considered.

3.3.3.9 Entrepreneurial HEIs

Created in 2016 and promoted by the Junior Enterprise Movement (in Portuguese, MEJ stands for *Movimento Empresa Júnior*), in partnership with the Brazilian Confederation of Junior Enterprises (Brasil Júnior), it adopted the name Entrepreneurial HEIs (or *IES Empreendedoras*, in Portuguese) from the 2023 edition onwards, combining the Ranking of Entrepreneurial Universities (in Portuguese, RUE stands for *Ranking de Universidades Empreendedoras*) with

the Index of Entrepreneurial Federal Institutes (in Portuguese, IIFE stands for *Índice de Institutos Federais Empreendedores*) (Brasil Júnior, 2024).

Entrepreneurial HEIs is based on data collected from three different sources (Universidades Empreendedoras, 2025):

- Perception survey: to collect the perceptions of the universities' own students;
- Ambassadors: volunteer students who collect self-reported information from universities; and
- Secondary sources: complementary databases based on existing information.

The Entrepreneurial HEIs methodology is presented in Chart 28. The dimensions of Entrepreneurial Culture, Innovation and Extension measure what substantially influences the degree of entrepreneurship at an HEI. The dimensions of Internationalization, Infrastructure and Financial Capital measure the means, providing the conditions for the development of academic leadership (Universidades Empreendedoras, 2025).

Chart 28. Methodology of the Entrepreneurial HEIs ranking

Criterion	Dimension	Indicator	Description
Integration into a favorable ecosystem	Infrastructure	Quality of infrastructure	Calculated based on the assessment of students' perceptions through the lens of physical infrastructure and internet availability and speed at the HEI.
		Technology Park	Composed of the sum of the indicators for the installation of a technology park in the city where the HEI is located and the existence of a partnership, association or agreement between the institution and the city's technology park.
		Environments that promote innovation	Seeks to measure the existence and quantity of environments that promote innovation in HEIs, as defined in Article 2 of Law No. 13243/2016 (indicator included in the 2023 edition).
	Internationalization	Exchanges	Number of international exchanges carried out by the HEI, covering both the departure of HEI students abroad and the arrival of foreign students at the HEI, divided by the number of students.
		Partnerships with foreign universities	Number of international partnerships per 1,000 students. Measures the offer of exchanges and integration through research with other universities.
		International collaborative research	Number of articles in international partnership compared to the number of IES production, extracted from Web of

Criterion	Dimension	Indicator	Description
			Science/InCites and normalized from 0 to 10, with 10 being the HEI with the highest value.
		Internationalization policies and plans	Assesses whether the HEI has internationalization policies and plans (indicator included in the 2023 edition).
	Financial capital	Budget	The total budget is divided by the number of students. The HEI with the highest ratio received a score of 10, with the scores of the other HEIs normalized based on this value.
		Budget efficiency	The calculation considers the difference between actual and planned expenditure, followed by normalization (indicator included in the 2023 edition).
		Extra budget	Indicator to assess other forms of fundraising by HEIs. Assesses resources from scholarships, technology transfers, royalties, endowment funds, and Research, Development and Innovation agreements (indicator included in the 2023 edition).
Academic community	Entrepreneurial culture	Student entrepreneurial attitude	Assessment of entrepreneurial characteristics present in HEI students; perception of students' entrepreneurial attitude and participation in the growth of an HEI project.
		Entrepreneurial attitude of faculty	Assessment of entrepreneurial characteristics present in HEI faculty; faculty experience in the job market; and perception of faculty entrepreneurial attitude.
		Evaluation of the curriculum	Contribution of the HEI's teaching methodology to the development of entrepreneurial skills; contribution of the course curriculum to the development of entrepreneurial skills; and flexibility in the curriculum for engagement in extracurricular activities.
Society development	Innovation	Research (average of two sub-indicators, normalized from 0 to 10, with 10 being the HEI with the highest value)	Number of citations per article: sub-indicator extracted from Web of Science/InCites.
			Production volume per 1,000 students at the HEI: sub-indicator extracted from Web of Science/InCites.
		Patents	Number of patents filed by the HEI over a 10-year period. Data extracted from WIPO.
		HEI-Market proximity (average of three sub-indicators, normalized from 0 to 10, with 10 being the HEI with the highest value)	Incubated Companies: sub-indicator with a weight of 6, assessed based on the number of incubated companies per 1,000 students at the HEI.
Results of Scientific, Technological and Innovation Institutions (ICTs): sub-indicator with a weight of 2, which considers only ICTs that are part of a HEI or that have a partnership with a HEI, whose information was self-reported by the HEIs through a questionnaire based on the Form on Intellectual Property Policy of Scientific, Technological and Innovation Institutions in Brazil (FORMICT) of the Ministry of Science, Technology and Innovation (MCTI).			

Criterion	Dimension	Indicator	Description	
			The indicator comprises the number of partnership agreements per 1,000 students and receives a multiplier factor proportional to the total value of the agreements (in BRL).	
			Technological Innovation Center (NIT) status: sub-indicator with a weight of 2, which analyzes the status of NIT implementation in HEIs, assigning 10 to HEIs that declare the existence of NIT and 5 to those that are in the process of implementation.	
		Technology transfer	Quantitatively measure the implementation of technology transfer carried out in the last two years. For this indicator, the following types of technology transfer are measured: license agreements, assignments, know-how, academic spin-offs, and Research and Development agreements (indicator included in the 2023 edition).	
	Extension		Networks	Shows how nationally representative student organizations – AIESEC, Brasil Júnior and Enactus – are viewed. This criterion was the most highly rated in the perception survey and therefore received a weight of 3. Junior enterprises in HEIs account for 80% of the score, while the existence of AIESEC and Enactus offices accounts for 10% each.
			Extension projects	Number of extension activities registered at the HEI, divided by the number of students at the institution, normalized from 0 to 10, with 10 being the HEI with the highest value.
			Altimetry	Impact of scientific productions in online environments, which considers a diverse set of information, such as citations, mentions, shares and likes on social media, among others. These figures were obtained from the Altmetric platform, with 10 being the HEI with the highest value.

Source: adapted from Universidades Empreendedoras (2025).

3.3.3.10 Triple E Awards

The Accreditation Council for Entrepreneurial and Engaged Universities (ACEEU) is the “only quality assurance body that operates globally with a focus on recognizing engagement and entrepreneurship in higher education. As such, the ACEEU evaluates, supports and stimulates the potential of HEIs on their path to excellence in their third mission” (ACEEU, 2025).

Headquartered in Germany, ACEEU was founded in 2016 and offers accreditation to HEIs based on their excellence in entrepreneurship and community engagement, which can be at the institutional, individual/team, partnership or program/initiative level (see Chart 29), regardless

of whether they are among the top 1 in the world or lesser-known regional institutions (ACEEU, 2025).

Since 2020, ACEEU has organized the Triple E Awards, the first award to focus on different dimensions of the third mission of universities. It is "a global recognition of efforts toward entrepreneurship and engagement in higher education". Implemented globally and regionally (Asia-Pacific, Americas, Africa and Europe), it aims to promote change in universities and emphasize their role in their communities and ecosystems. Registration is open to all HEIs, and winners are selected through a two-step process: after selecting the five best entries in each category in each region, additional information must be submitted, which will serve as the basis for the final ranking of entries and the selection of the category winner (Triple E, 2025).

Chart 29. Methodology of the Triple E Awards (global coverage)

Category	Description	Criteria	Weight
Engaged University of the Year (institutional)	HEIs that have demonstrated exceptional commitment to promoting partnerships, driving positive social change, and promoting the public good. Recognizes universities that have adopted community engagement as a core value, integrating it into their teaching, research and operations.	Integration of Engagement into Institutional Strategy	25%
		Breadth and diversity of engagement activities	25%
		Innovation in engagement practices	20%
		Tangible impact on the community and society	20%
		Sustainability of engagement efforts	10%
Green University of the Year (institutional)	HEIs that exemplify an exceptional commitment to environmental protection and sustainability. This includes integrating sustainable practices into resource planning, operations, research and teaching, while promoting a culture of environmental responsibility among staff, students and the wider community. Recognizes institutions where environmental stewardship is a core value and the promotion of green initiatives inspires meaningful change on and off campus.	Integration of Sustainability into Institutional Strategy	25%
		Breadth and diversity of sustainability initiatives	25%
		Innovation in Green Practices	20%
		Tangible Environmental Impact	20%
		Sustainability of Green Initiatives	10%
Entrepreneurial Leadership Team of the Year (team)	Leadership team in higher education that has excelled in applying entrepreneurial thinking to seize opportunities and deliver impactful results. The	Opportunity Identification and Strategic Vision	30%

Category	Description	Criteria	Weight
	leadership team may consist of members from various levels and units, including but not limited to roles across the university, faculty or school administration, departmental leadership, research unit directors, support unit management or student leaders.	Implementation and Realization of Initiatives	25%
		Collaboration and Partnerships	25%
		Impact and Sustainability	20%
Entrepreneurship Educator of the Year (individual)	Individual educator who has demonstrated exceptional dedication and success in promoting entrepreneurial mindsets and skills. Recognizes innovative teaching methods, impactful mentoring and a commitment to equipping students with the knowledge and tools to thrive in entrepreneurial environments. Open to faculty members from all academic categories, including professors and lecturers.	Innovation in Teaching and Curriculum Design	30%
		Impact on student learning and entrepreneurial development	30%
		Engagement and Mentoring	20%
		Contribution to the field of entrepreneurial education	20%
Engaged Academic of the Year (individual)	An individual from the academic community who has demonstrated exceptional dedication and effectiveness in engaging with external stakeholders. Recognizes a faculty member, researcher or academic professional who has gone beyond the traditional scope of academic duties to actively and meaningfully connect with external entities, such as industry partners, community organizations, government agencies or non-profit organizations. The ideal candidate is someone who demonstrates a strong commitment to applying academic expertise in a way that directly benefits society. This includes translating research into practical solutions, participating in collaborative projects with external partners, contributing to policy development, or actively working on community-based initiatives. It highlights the importance of bridging the gap between academia and the wider world.	Extent and quality of stakeholder engagement	30%
		Application of academic expertise to external challenges	30%
		Innovation in engagement practices	20%
		Impact on business and/or society	20%
University Alliance of the Year (partnership)	Alliance of HEIs that exemplifies exceptional collaboration in addressing shared challenges and advancing collective goals. Recognizes alliances that leverage expertise, resources and networks to enhance education, research and service, while promoting innovation and resilience.	Strategic vision and collaborative approach	30%
		Innovative Practices and Solutions	25%
		Tangible Impact on Stakeholders	25%
		Sustainability and Future Growth	20%
Innovation and Entrepreneurship Ecosystem of the Year (partnership)	An ecosystem that is affiliated with a university or has a university as its main stakeholder. The ideal ecosystem demonstrates a strong integration of academic research and entrepreneurial spirit, encouraging the development of startups, innovative projects, and collaborations between academia, industry and other community stakeholders. It recognizes ecosystems for their role in nurturing entrepreneurial talent, facilitating the transfer of	Diversity and inclusion of stakeholders	30%
		Integration with Research and Academic Learning	25%
		Impact and Success of Startups and Initiatives	25%

Category	Description	Criteria	Weight
	knowledge from academia to the market, and contributing to the economic and social development of their communities. These ecosystems not only support the growth of new ventures but also play a key role in shaping a culture of innovation and entrepreneurship within and around the university, setting an example for future academic entrepreneurship initiatives.	Sustainability and Growth Potential	20%
Entrepreneurship Course of the Year (program)	Higher education course (short-term programs, semester-long lectures and bachelor's, master's or doctoral degree programs) that excels in developing students' entrepreneurial mindsets and skills, fostering innovation, and encouraging practical application in the real world. Recognizes courses that effectively combine theoretical rigor with experiential learning. Recognized courses go beyond traditional classroom instruction and inspire creativity, adaptability and a proactive approach. Innovative elements such as the incorporation of collaborative projects, industry partnerships and mentoring prepare students for the complexities of entrepreneurship in a rapidly evolving global landscape.	Innovation in Course Design	30%
		Integration of Experiential Learning	30%
		Impact on Student Outcomes	20%
		Relevance and Scalability	20%
Campus of Tomorrow Award (initiative)	University that demonstrates exceptional vision and leadership in shaping the future of campus development. Recognizes institutions that integrate sustainability, innovation and inclusion into their campus planning and operations, creating spaces that are not only functional but also inspiring and forward-thinking. Recognizes universities that excel at reimagining physical and digital environments to promote collaboration, advance research and enhance learning experiences.	Visionary Campus Development	30%
		Campus Design and Technology Innovation	30%
		Inclusion and Accessibility	20%
		Sustainability and Environmental Impact	20%
EdTech Innovation of the Year (initiative)	Innovative advancement in educational technology that has significantly improved learning, teaching or accessibility in higher education. Recognizes transformative and scalable digital tools, platforms and/or approaches that address diverse learning needs, improve teaching effectiveness or promote inclusion.	Innovation and Creativity	30%
		Impact and Effectiveness	30%
		Scalability and Adaptability	20%
		User Inclusion and Engagement	20%
University Venture of the Year (initiative)	An enterprise that originates from a HEI (student-led startups, university spin-offs and scientific or university-owned companies) and demonstrates a strong commitment to creating value for the economy and/or society through innovative ideas, cutting-edge technology or transformative solutions that translate academic research and entrepreneurial ambition into real-world impact.	Innovation and Uniqueness of the Venture	30%
		Growth and Scalability	25%
		Social and Economic Impact	25%
		Sustainability and Long-Term Vision	20%
SDG Impact Award (initiative)	Initiative within higher education that has made a significant and measurable contribution to advancing the UN SDGs. Recognizes exemplary efforts that align with global sustainability priorities, addressing urgent challenges such as poverty, inequality, climate change and quality education.	Alignment with the UN SDGs	30%
		Innovation and Creativity	25%
		Measurable Impact	25%
		Scalability and replicability	20%

Category	Description	Criteria	Weight
Scientific Communication Award (initiative)	HEI or individual who demonstrates exceptional skill and dedication in translating complex scientific concepts into accessible and meaningful narratives for diverse audiences. Recognizes innovative approaches to promoting scientific literacy, inspiring curiosity, and fostering a deeper public appreciation for science and its role in society.	Clarity and Accessibility	30%
		Creativity and Innovation	25%
		Impact and Engagement	25%
		Relevance and Social Contribution	20%
Student-led Impact Initiative of the Year (initiative)	A student-led project or initiative that has demonstrated significant positive impact within the academic community or beyond. Whether through social entrepreneurship, community service, sustainability efforts or other impactful endeavors, the winning initiative is a testament to the power of student leadership and collaboration.	Innovation and Creativity	30%
		Leadership and Teamwork	25%
		Community Involvement and Engagement	25%
		Impact and Effectiveness	20%
Women's Entrepreneurial Empowerment Award (initiative)	HEI or initiative that has demonstrated exceptional commitment to empowering (future) female entrepreneurs and promoting inclusion, building supportive communities and creating opportunities for women to thrive as entrepreneurs. Recognizes programs, networks or initiatives that effectively address the unique challenges and barriers faced by women in entrepreneurship, such as access to mentoring, financing and resources.	Impact on women entrepreneurs	30%
		Innovation in Program Design	25%
		Inclusion and Community Building	25%
		Sustainability and Scalability	20%
Engaged Research of the Year (initiative)	Research project or initiative (completed or ongoing) that exemplifies exceptional social impact through co-creation, inclusion and practical application of research findings to solve complex social problems.	Relevance and Social Impact	30%
		Community Collaboration	25%
		Innovation in Design and Research Approach	25%
		Communication and Dissemination of Results	20%

Source: adapted from Triple E (2025).

3.3.3.11 Global League of Entrepreneurial Universities (GLEU)

The Global League of Entrepreneurial Universities (GLEU) was launched by ACEEU in 2021 and is a collaborative platform supported by entrepreneurship-related organizations from around the world, including networks, associations, societies, research centers and government organizations. The League's objectives are (Entrepreneurial Universities, 2025):

- To provide a platform that can help students, businesses, academics, governments and funding agencies find the "right" university;

- To give universities the recognition they deserve for their entrepreneurial efforts and their commitment to developing their entrepreneurial profile; and
- Highlight initiatives around the world that promote entrepreneurial universities.

Currently, there are 115 related institutions in four categories, as shown in Chart 30 (Entrepreneurial Universities, 2025):

Chart 30. Methodology of the Global League of Entrepreneurial Universities (GLEU) platform

Category	Description
Accredited institutions	HEIs listed in this category have obtained ACEEU Entrepreneurial University Accreditation. The institutions underwent a qualitative external evaluation covering 15 different aspects of an entrepreneurial university, including, but not limited to, the university's commitment to entrepreneurship, entrepreneurial leadership approaches, team development for academic entrepreneurship, the institution's entrepreneurial culture, and support services and structures.
Award-winning institutions	<p>The institutions highlighted in this category received an award for their entrepreneurial profile and/or achievements. Only awards that reflect a broader implementation of entrepreneurship are considered (for example, an award for excellence in entrepreneurship education is too narrow, while an award for startup achievements is considered to reflect a certain entrepreneurial culture within the institution, support for startups, development of entrepreneurial competence, etc.).</p> <p>Recognizing that such an assessment is subjective, the awards taken into consideration are presented below:</p> <ul style="list-style-type: none"> ▪ THE Award – Entrepreneurial University of the Year, United Kingdom; ▪ THE Award – Outstanding Entrepreneurial University, United Kingdom; ▪ Deshpande Symposium – Entrepreneurial University Award, United States; ▪ UP Award – Most Entrepreneurial University, Portugal; ▪ Ministry of Higher Education (MOHE) Award – Most Entrepreneurial University of the Year, Malaysia; and ▪ German Government EXIST IV Entrepreneurial University designation.
Highly ranked institutions	<p>The institutions featured in this category occupy high positions in national or international university rankings for entrepreneurship. For national rankings, the top three HEIs are considered; for international rankings, the top five HEIs.</p> <p>Like the selection of awards (above), the selection of rankings that are considered is also subjective and, therefore, detailed below:</p> <ul style="list-style-type: none"> ▪ Entrepreneurial HEIs, Brazil; ▪ PitchBook; and ▪ TUBITAK EIUI, Turkey.
Self-proclaimed institutions	Institutions in this category make clear reference to entrepreneurship in their vision or mission statement, or clearly position themselves as a university in which entrepreneurship plays a key role.

Source: adapted from Entrepreneurial Universities (2025).

3.3.3.12 Panel on Innovation Economics at Federal Universities

In 2023, the Office of the Comptroller General (CGU) published the "Panel on Innovation Economics at Federal Universities" as a result of its Audit Report No. 817023 to assess whether

arrangements, strategies, incentives and policies in Brazil's innovation ecosystem are contributing to the development of innovation by the federal higher education network. The Panel can "increase the capacity for analysis and understanding of the Brazilian innovation ecosystem, assisting in the construction and improvement of public policies for Science, Technology and Innovation" (CGU, 2023). The Panel's evaluation structure is presented in Chart 31.

Chart 31. Panel on Innovation Economics at Federal Universities

Dimension	Description	Scope
Resources	Funding that differentiates the university from other public or private entities, even if provided by external sources, existing and available to generate innovation, due to its institutional attributes	Financial resources including contributions from the Ministry of Education, funds raised through projects and funds raised from federal development agencies
		Environments attractive to entrepreneurship and innovation, with context analysis of science and technology parks and incubators linked to Federal Institutions of Higher Education
		Specialized human resources: teachers, employees of the Technological Innovation Center (NIT) and Administrative Technicians in Education (TAEs)
		Research infrastructure, restricted to the evaluation of the use of Federal Institutions of Higher Education physical assets in projects and in investments by the Brazilian Innovation Agency (FINEP), through CT Infra.
Capabilities	The University's ability to generate innovation through interaction with other agents in the ecosystem, considering those that favor relationships both directly and previously within the organization itself	Innovation incorporated into institutional strategy: plans, policies and standards; establishment of partnerships with sectors of society, innovation environments and the concept of innovation in force at Federal Institutions of Higher Education
		Cooperative activities: research projects and service provision
		Project governance, restricted to the registration of innovation, project screening and the handling of conflicts of interest
		Communication strategy for innovation
		Incentives for faculty members to innovate, with a focus on scientific publication, encouragement of innovation activities in faculty advancement and evaluation of graduate programs
		Technical, legal and commercial knowledge for intellectual property protection and technology transfer
Activities	Actions inherent to the university environment that indirectly or directly promote innovation	Scientific research: characteristics of research and invention communications
		Establishment of partnerships, with a focus on prospecting partnerships and their obstacles
		Intellectual property management: activities in the process of registering intellectual property nationally and internationally and abandoning intellectual property
		Project management: screening projects for potential intellectual property generation and project processing

Dimension	Description	Scope
		Student/faculty training for entrepreneurship and innovation
Products	The result of a process considered an intermediate product when it can be broken down or is necessary for the subsequent stage, embodied as final product in the innovation chain, whether or not linked to intellectual property	Intermediate products: required intellectual property; characteristics of the required intellectual property
		Final products: generation of spin-offs; scientific publications; companies with relationships with science and technology parks and incubators; knowledge transfer through the provision of services; transfer of intellectual property technology
		Innovation resulting from research projects and service provision
Clients	Public, private and society in general who appropriate the innovation generated in the university ecosystem	Legal entities that are partners in technology transfer agreements
		Legal entities that are partners in intellectual property (co-owners)
		Legal entities that are partners in research projects and service provision
		Legal entities that are partners in publication
Impacts	Positive externalities to the economic and social dimensions generated by innovation activities	Innovation in companies: rate of return and time to return on intellectual property
		Revenues collected from the return on intellectual property
		Local, regional and national impact of technology transfer
		Participation of Federal Institutions of Higher Education in the national intellectual property balance sheet
Public value	Contributions of the University to add value to the production chain	Strengthening the link between universities, companies and the state

Source: adapted from the “Panel on Innovation Economics at Federal Universities” (CGU, 2023).

3.3.3.13 Comparison of the evaluation methods presented

Chart 32 presents a summary of the means of evaluating the entrepreneurial performance of HEIs found in the literature and presented in this subsection, in chronological order of their creation.

Chart 32. Comparison of the means of evaluating the entrepreneurial performance of HEIs

Ranking or Tool	Year of creation / Origin / Scope	Evaluation	Characteristics
National University Rankings	2005 / Washington Monthly / National (United States)	Public and statistical data	Ranks American universities offering bachelor's degrees in the arts and sciences in terms of their contribution to the public good. Three dimensions: social mobility, research, and community and national service.
Top Schools for Entrepreneurship	2006 / Princeton Review / National (United States)	Institutional research	More than 300 American institutions ranked according to the entrepreneurial study opportunities they offer at the undergraduate and graduate levels. Six dimensions: academics and requirements, students and faculty, alumni

Ranking or Tool	Year of creation / Origin / Scope	Evaluation	Characteristics
			ventures, outside the classroom, organized competitions, and scholarships and grants.
America's Top Colleges	2008 / Forbes / National (United States)	Economic and social indicators	Ranks the 500 American HEIs that produce graduates "from all economic backgrounds, with less student debt". Seven dimensions: alumni salary, debt, graduation rate, Forbes list of American leaders, return on investment, retention rate, and academic success.
Entrepreneurial and Innovative Universities Index (EIUI)	2012 / Scientific and Technological Research Council of Turkey (TÜBİTAK) / National (Turkey)	Quantitative, based on public data	Ranks the top 50 Turkish universities out of 208. Four dimensions: scientific and technological research capabilities, intellectual property, cooperation and interaction, economic and social contribution.
Guiding Framework for Entrepreneurial Universities	2012 / Organization for Economic Cooperation and Development (OECD) / Global	Institutional self-assessment	Tool for self-assessment of HEIs through responses to statements on a scale of agreement/compliance ranging from 0 to 10. There are suggestions for good practices for each statement. Eight dimensions: leadership and governance; organizational capacity, people, and incentives; development of entrepreneurship in teaching and learning; pathways for entrepreneurs; university-business and other external relationships for knowledge exchange; internationalized institution; measuring the impact of the entrepreneurial university.
HEInnovate	2013 / European Union and OECD / Global	Institutional self-assessment	Tool for HEI self-assessment through responses to statements, on a scale from "no data available to respond" to the degree of agreement/compliance, ranging from 1 to 5. There are suggestions for best practices for each statement. Eight dimensions: leadership and governance, organizational capacity, teaching and learning entrepreneurship, preparing and supporting entrepreneurs, digital transformation and capacity, entrepreneurial ecosystems and networks, internationalized institution, and impact of the entrepreneurial HEI.
World's Most Innovative Universities	2015 / Thomson Reuters / Global	Patent and article metrics	Represents an intermediate alternative between academic and business rankings of universities. Three dimensions: patents, articles and citations.
Pitchbook Universities	2015 / Pitchbook / Global	Venture capital data	This accounts for the number of entrepreneurial alumni worldwide who have raised venture capital over the past decade, based on Pitchbook's own data on global venture capital investment and an analysis of nearly 167,000 founders backed by venture capital.
Entrepreneurial HEIs	2016 / Brazil Junior / National (Brazil)	Student perception and secondary data	Based on data collected from: perception surveys of HEI students; ambassadors (volunteers); and secondary sources. Six dimensions: infrastructure, internationalization, financial capital, entrepreneurial culture, innovation and outreach.
Triple E Awards	2020 / Accreditation Council for	Voluntary entry awards	First award to focus on different dimensions and criteria of the third mission of universities (open to all HEIs). After selecting the five best entries in

Ranking or Tool	Year of creation / Origin / Scope	Evaluation	Characteristics
	Entrepreneurial and Engaged Universities (ACEEU) / Global		each category in each region, additional information must be submitted for the final classification of entries and selection of the winner of the category. ACEEU offers accreditation to HEIs based on their excellence in entrepreneurship and community engagement, which can be at the institutional, individual/team, partnership or program/initiative level.
Global League of Entrepreneurial Universities (GLEU)	2021 / ACEEU / Global and regional (Asia-Pacific, Americas, Africa and Europe)	Accreditation and recognition	A collaborative platform supported by entrepreneurship-related organizations around the world, with the objectives of providing recognition for entrepreneurial efforts and commitment to developing entrepreneurial profiles and highlighting initiatives around the world.
Panel on Innovation Economics at Federal Universities	2023 / Office of the Comptroller General (CGU) / National (Brazil)	Data and information obtained in the audit conducted by the CGU at Federal Institutions of Higher Education	Assesses whether arrangements, strategies, incentives and policies in Brazil's innovation ecosystem are contributing to the development of innovation by the federal higher education network. Assists in the construction and improvement of public policies for Science, Technology and Innovation in the country. Seven dimensions: resources, capabilities, activities, products, customers, impacts and public value.

Source: author.

Chart 33 presents a compilation of the dimensions of the means of evaluating the entrepreneurial performance of the HEIs presented.

It should be noted that the dimension “financial capital” is common in eight of the twelve means of assessment presented. The dimensions “extension” and “entrepreneurial attitude of students and alumni ventures” appear in seven of them; and in six of them, the dimensions “scientific and technological research”, “entrepreneurial ecosystem and networks” and “infrastructure”. The “customers” dimension appears only in CGU Panel, although stakeholders are covered in the other dimensions of the evaluation methods presented. It was found that what some rankings called “dimensions” would be classified in this research as performance indicators themselves, such as graduation rate and retention rate in America's Top Colleges ranking.

Regarding the particularities of the means of evaluating the entrepreneurial performance of HEIs, Top Schools for Entrepreneurship has an academic focus (student and faculty bodies; programs and competitions); National University Ranking, *Triple E Awards* and HEInnovate evaluate social and community impact in particular; and America's Top Colleges has a financial focus (salaries; debt; return on investment).

Chart 33. Compilation of dimensions common to the evaluation methods presented

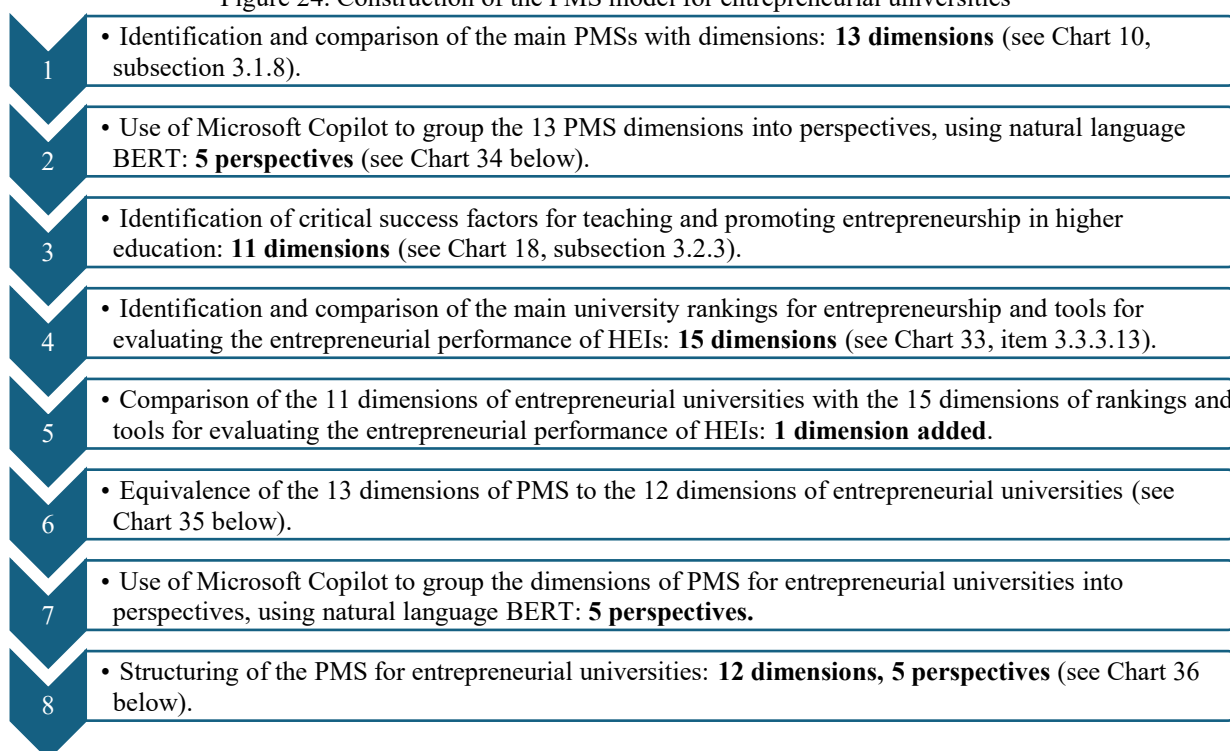
Dimensions	Means of evaluating the entrepreneurial performance of HEIs											
	National University Rankings	Top Schools for Entrepreneurship	America's Top Colleges	EIUI	OECD	HEInnovate	World's Most Innovative Universities	Pitchbook	Entrepreneurial HEIs	Triple E Awards	GLEU	CGU
Scientific and technological research	x			x			x		x	x		x
Entrepreneurial attitude of students and ventures of former students	x	x	x					x	x	x		x
Entrepreneurial attitude of teaching and technical staff / Specialized human resources / Team development for academic entrepreneurship		x							x	x	x	x
Graduation rate			x									
Retention rate			x									
Intellectual property				x			x		x			x
Leadership and governance (include structure, strategy, incentives, rewards and female entrepreneurial empowerment)					x	x				x	x	x
Entrepreneurship teaching and learning / Academics and requirements / Outside the classroom / Competitions organized by the HEI / Digital transformation and capacity		x			x	x			x	x		
Ecosystem and entrepreneurial networks for knowledge exchange / Cooperation and interaction / Public value				x	x	x			x	x		x
Internationalization				x	x	x			x			
Extension / Impacts (including flexibility to change and regular evaluation) / Economic and social contribution (including to UN SDGs) / Volunteering / Community engagement	x			x	x	x			x	x		x
Infrastructure / Preparation and support for entrepreneurs / Support services and structures (including accessibility)					x	x			x	x	x	x
Financial capital / Return on investment / Scholarships and grants	x	x	x		x	x		x	x			x
Clients												x
Commitment to environmental protection and sustainability						x				x		

Source: author.

4 PMS MODEL FOR ENTREPRENEURIAL UNIVERSITIES

Figure 24 illustrates how the PMS model for entrepreneurial universities was constructed, and the eight stages are explained below.

Figure 24. Construction of the PMS model for entrepreneurial universities



Source: author.

1. Based on scientific literature, six main PMSs with defined dimensions were identified: Results and Determinants Framework, BSC, Sink & Tuttle Model, Skandia Intellectual Capital Navigator, Performance Prism and SMDG, which were compared and whose dimensions were defined and presented in Chart 10 (see subsection [3.1.8](#)).
2. Considering the “Dimensions” and “Definitions” columns of that chart, on August 21, 2025, using Microsoft’s artificial intelligence assistance center, Microsoft 365 Copilot Chat (with GPT-5 enabled), the following command was issued: "based on the following dimensions, group them using natural language BERT". Five perspectives were identified, and the result is presented in Chart 34.

Chart 34. Perspectives of common dimensions in the PMSs presented

Perspectives	Justification	Dimensions
Strategic Governance	Dimensions of orientation, intention, direction.	Strategies Leadership
Results	Goal achievement (Effectiveness) and economic outcome (Financial).	Effectiveness Financial (or, for the public context: Budget Execution, Economy, Cost per Service, Impact on Society)
Stakeholders and Relationships	Deals with agreements with stakeholders (customers/citizens, investors, regulators, society, suppliers): expectations, satisfaction,	Stakeholder satisfaction Contribution of stakeholders

Perspectives	Justification	Dimensions
	and the expected delivery of each party.	
Operational Excellence	These are dimensions of how the organization transforms resources into value, with optimal cost/time/quality and adaptability.	Processes Efficiency Productivity Quality Flexibility
Capacity and People	Bring together the enablers that make sustained performance and preparation for future opportunities possible (capacity, skills, engagement and culture).	Organizational Capacity Human

Source: adapted from Microsoft 365 Copilot Chat (2025).

3. Next, these results were compared with the eleven dimensions of entrepreneurial universities identified in the Systematic Literature Review and presented in Chart 18 (see subsection [3.2.3](#)).
4. In addition to this theoretical perspective, and in order to obtain a practical view of the PMS model, the dimensions of entrepreneurial universities were compared with the dimensions common to the means of assessing the entrepreneurial performance of HEIs, presented in Chart 33 (see item [3.3.3.13](#)).
5. Once this was done, one dimension was added to the eleven dimensions of entrepreneurial universities: **commitment to environmental protection and sustainability**. This is defined as the adherence of the activities developed by the HEI (teaching, research, extension and management) to sustainable practices, which includes compliance with the UN SDGs. It concerns the commitment to promoting a culture of environmental responsibility among employees, students and the community in general, and efforts to promote green initiatives on and off campus. Environmental sustainability must also be considered for development that is not harmful to the planet. The concept of the quintuple helix incorporates the theme of the environment by considering the growing concern with global warming and sustainability issues (QS, 2024; Triple E, 2025; GreenMetric, 2024; Mineiro, 2019).
6. Chart 35 presents the equivalence of the dimensions of PMS and entrepreneurial universities, with the respective justifications. It was found that the twelve dimensions

of entrepreneurial universities encompass the elements and aspects of the thirteen defined dimensions of PMS.

Chart 35. Equivalence of PMS dimensions and entrepreneurial universities

Perspectives	PMS dimensions	Equivalent dimensions of entrepreneurial universities	Justification
Strategic Governance	Strategies	Strategy	Entrepreneurial and internationalization actions must be institutionalized in the mission and strategy of the HEI and reflected in the application of resources and performance evaluation indicators. This means directing the university toward knowledge transfer, the exploration of opportunities and social commitment, seeking to maintain its competitiveness.
	Leadership	Leadership and specialized human resources	It is the leaders who establish the values, intentions and guidelines of the HEI and are therefore responsible for guiding and disseminating a culture of innovation and entrepreneurship. They must be qualified in entrepreneurial thinking and practice.
Results	Effectiveness	Students and alumni Activities for exploring university knowledge Collaborative innovation networks Extension	The concept of "doing the right things" involves monitoring students' academic engagement during their courses, the employability rate of graduates and the degree of involvement in entrepreneurial activities of former students. In addition, university knowledge exploration activities aim to meet innovation goals based on scientific and technological research in partnership with the ecosystem, while extension activities seek to solve problems in the environment in which the HEI operates.
	Financial	Finance	Budget management must be aligned with the entrepreneurial strategy, and the HEI must raise external funds to ensure specific funds for the promotion of entrepreneurship and its financial health.
Stakeholders and Relationships	Stakeholder satisfaction	Students and alumni Extension	Extension activities aim to serve the internal audience of the HEI, in addition to the needs of society, industry and the public sector, by engaging the HEI with its immediate environment. In particular, the satisfaction of students and graduates (alumni) should be monitored during and after courses, in terms of academic engagement, graduation and retention rates, graduate employability rates, number of businesses opened and in operation, and net sales revenue of companies founded by students/graduates, for example.
	Contribution of stakeholders	Activities to explore university knowledge	Governments, companies, other HEIs, alumni, business professionals and social leaders contribute to the achievement of entrepreneurship and innovation objectives by establishing partnerships for knowledge

Perspectives	PMS dimensions	Equivalent dimensions of entrepreneurial universities	Justification
		Collaborative innovation networks	exchange and technology transfer, as well as for scientific and technological research.
Operational Excellence	Processes	Entrepreneurial teaching Entrepreneurial practice Extension Collaborative innovation networks	It is through teaching (theoretical and practical), scientific and technological research in partnership with the ecosystem, and extension activities that the strategy of entrepreneurship, innovation and social commitment will be implemented and that the HEI will be able to create and deliver value to stakeholders and contribute to society.
	Efficiency	Structure	The concept of "doing things right" involves the organizational structure, as it is the fabric on which the entrepreneurial strategy will be woven: the structure dictates workflows and those responsible, influencing timelines and the use of resources.
	Productivity	Entrepreneurial teaching Entrepreneurial practice Activities for exploring university knowledge Collaborative innovation networks	The productivity of an entrepreneurial HEI can be measured in terms of teaching (theoretical and practical), scientific and technological research, and activities that exploit university knowledge. For example, in terms of the number of startups created, partnership agreements signed, innovations produced by faculty, students, and technicians, external training and teaching offered, regional clusters and international networks in which the HEI participates, co-publications and co-patents with industrial partners, theses and dissertations in cooperation with regional organizations, among others.
	Quality	Students and alumni Extension Collaborative innovation networks	It is up to the stakeholders to define excellence in delivery, so that students and alumni evaluate teaching, the community/society evaluates extension, and partners from industry, the public sector and other HEIs evaluate scientific and technological research.
	Flexibility	Structure	As market and societal demands, and even government regulations, are dynamic, it is the organizational structure that must be able to respond to change, through the processing times of internal approval processes and instances, the reduction of bureaucratic and cultural barriers, and the coordination of entrepreneurial activities within the institution and with other stakeholders in the ecosystem.
Capacity and People	Organizational Capacity	Technology and Innovation Infrastructure	To enable the sustained performance of the HEI, a combination of commercial, professional and physical infrastructure, as well as sufficient and accessible communication and information technologies for students, faculty and staff, is

Perspectives	PMS dimensions	Equivalent dimensions of entrepreneurial universities	Justification
		Commitment to environmental protection and sustainability	necessary to promote entrepreneurial teaching and practice and to carry out activities that exploit university knowledge. In addition, a commitment to environmental protection and sustainability demonstrates the HEI's concern and preparedness for future opportunities, in line with the UN SDGs and the quintuple helix concept.
	Human	Leadership and specialized human resources Students and alumni	The HEI workforce needs to be nurtured with practices that encourage and promote its identification with the entrepreneurial mission and activity, so that teachers and technicians respond to the culture of internationalization, innovation and social commitment that is sought. The human capital of a HEI can also include students and alumni, since there is no entrepreneurial university without considering the results of this group's performance.

Source: author.

7. Again using Microsoft 365 Copilot Chat (with GPT-5 enabled), on September 9, 2025, considering the columns "Dimensions" and "Definitions" in Chart 18 (see subsection [3.2.3](#)), as well as the additional dimension "commitment to environmental protection and sustainability" and its respective definition in item 5 of this list, the same command as before was issued: "based on the following dimensions, group them using natural language BERT". Five perspectives were identified, as shown in Chart 36.

Chart 36. PMS model for entrepreneurial universities

Perspectives	Justification	Dimensions
Governance and Direction	Define the direction, design how the organization works, and anchor the entrepreneurial culture (leadership, incentives, evaluation and recognition).	Structure: must be flexible to adapt to market and societal demands and to coordinate the entrepreneurial agenda within the HEI and with other stakeholders in the ecosystem. The division and workflows, hierarchy (bottom-up) and mechanisms for managing joint efforts, translated through regulations and policies, should seek to reduce bureaucratic and cultural barriers, processing times and internal approval instances.
		Strategy: it must establish the entrepreneurial agenda and incorporate innovation, internationalization and social commitment into its objectives. The strategy generates performance measures. It involves defining one of the strategic archetypes, according to the university's main driver (research, industry, innovation or commerce), which is influenced by factors such as institutional heritage, economic and political environment, and organizational culture and leadership.
		Leadership and specialized human resources: both faculty and technical staff must be developed and trained in entrepreneurship, and this entrepreneurial qualification is not restricted to leaders. Leaders must also be

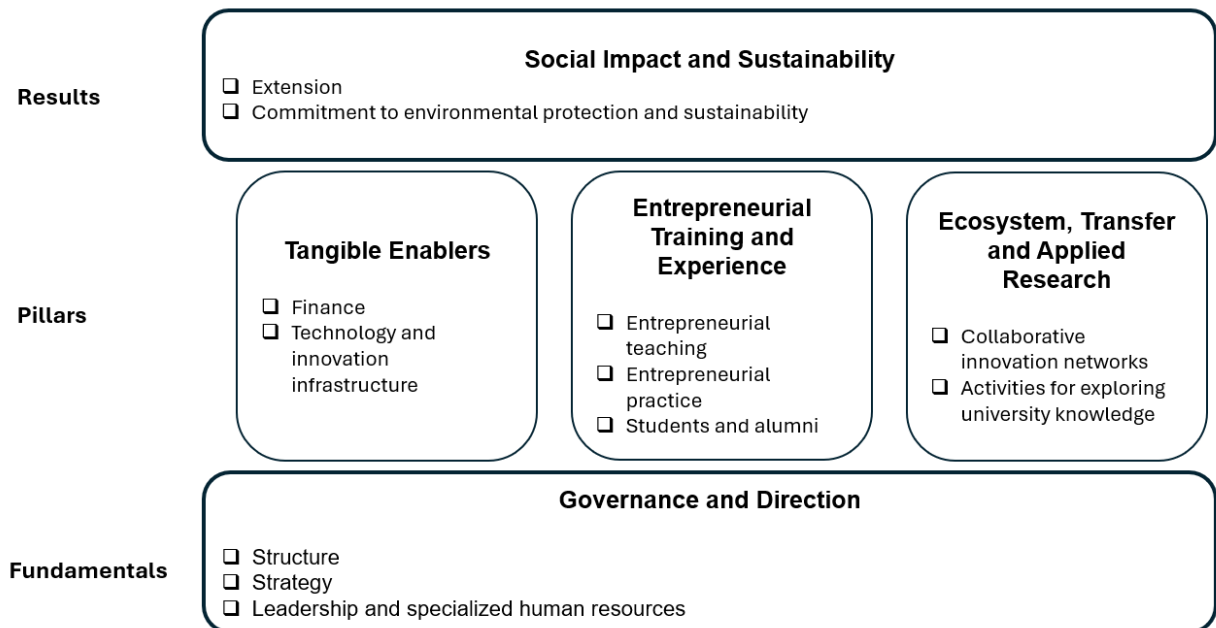
Perspectives	Justification	Dimensions
		participatory, dynamic and committed to the entrepreneurial strategy in order to influence the behavior of the rest of their team.
Tangible Enablers	These bring together the critical means (budget/fundraising, endowments, funds, scholarships; laboratories, Technological Innovation Centers/Technology Transfer Offices, incubators, hubs, parks, information and communication technology) that enable strategy and innovation.	<p>Finance: this involves managing the public budget received and raising external funds, not from government sources, in patents, contracted research, partnerships with private companies, federal development agencies and regional sources. It also includes the provision of scholarships and grants for students in vulnerable economic situations and incentives for teachers and technicians engaged in innovative initiatives.</p> <p>Technology and innovation infrastructure: this refers to the commercial, professional and physical infrastructure for connecting universities to the productive sector and stimulating entrepreneurial thinking. It includes the physical assets and communication and information technologies of classrooms and innovation habitats.</p>
Entrepreneurial Training and Experience	This includes training (curricular and extracurricular with active and digital methodologies), practical experiences (events, hackathons, pre-acceleration, junior companies), and monitoring the student/alumni cycle (employability, entrepreneurship, support network).	<p>Entrepreneurial teaching: should occur in all university courses and be interdisciplinary, making use of digital technologies and active methodologies, with a focus on employability, the academic and psychological development of students, and the internationalization of the curriculum.</p> <p>Entrepreneurial practice: collaborative extracurricular experiences for more realistic approaches, such as innovation habitats, to expose students and the human resources of the HEI to entrepreneurial environments and develop technical and interpersonal skills and abilities.</p> <p>Students and alumni: they are a thermometer of institutional effectiveness and quality. Students are the <i>raison d'être</i> of the HEI and active agents in innovation, reputation and knowledge building. Alumni are valuable sources of information for external evaluation and provide feedback for improving courses and HEI management, while also serving as ambassadors for the university and contributing their experiences and services. Both students and alumni can also be part of the HEI workforce, adding to the university's human capital.</p>
Ecosystem, Transfer and Applied Research	They connect the HEI with industry, government and other HEIs, enabling partnerships, technology transfer, research and development contracts, spin-offs, licenses, and co-production of knowledge (co-patents/co-publications).	<p>Collaborative innovation networks: internal partnerships and partnerships between universities and government, universities and companies, and universities and other HEIs. This represents the relational interdependence for sharing practices and research and for renewing the curriculum.</p> <p>Activities for exploring university knowledge (or Commercialization, Applied Research, and External Training and Teaching): represent the institutional commitment to knowledge exchange and technology transfer with society, the university, industry and the public sector, with a focus on practical applications. These are innovations produced by faculty, students and technicians, as well as paid continuing professional development activities.</p>
Social Impact and Sustainability	These embody the impact on society (public communication of science, public policies, culture, volunteering) and the Environmental, Social and	Extension (or Community Activities and Popular Scientific Communication): active prospecting for problems and opportunities in the community, local businesses or the public sector. It represents the academic engagement, direct and indirect, of the HEI with its immediate environment for knowledge transfer.

Perspectives	Justification	Dimensions
	Governance agenda across the HEI.	Commitment to environmental protection and sustainability: adherence of the activities developed by the HEI (teaching, research, extension and management) to sustainable practices, which includes compliance with the UN SDGs.

Source: author, adapted from Microsoft 365 Copilot Chat (2025).

8. Figure 25 presents the structure of the PMS for entrepreneurial universities.

Figure 25. Proposed structure of the PMS model for entrepreneurial universities



Source: author.

Replacing the pilot test stage of the method used in this thesis (case study, explored in section [2.2](#)), three experts in entrepreneurship and innovation were consulted to validate the model, and their considerations are presented below.

- **Expert 1:** the interview was conducted on September 30, 2025, and lasted approximately 1 hour and 35 minutes. Regarding the perspectives arising from the BERT natural language grouping and the definitions presented for each dimension, they were considered sufficient and no adjustments were proposed. Regarding the indicators, the expert asked for more details on what each position in the value chain meant, to which the author presented some examples. The expert then saw no obstacle to classifying the indicators according to their position in the value chain. She considered that it is not enough for a university to offer physical and technological infrastructure if entrepreneurial behavior is not encouraged. She stated that the

curtailment of free expression can occur in basic education, with effects felt in higher education. The author took the opportunity to add that this reinforces the findings in the literature that entrepreneurship should be taught from an early age.

The expert also emphasized that teachers/professors should encourage students to be creative and to "think outside the box" – which are essential entrepreneurial skills. Another point made by the expert concerns the attitude of teachers/professors, who should see value in interdisciplinarity and truly engage in active and innovative teaching methodologies.

Finally, the expert concluded that the model was "very well structured and coherent" and that the performance indicators addressed all aspects that the PMS intends to measure, representing a "wonderful contribution to the field".

- **Expert 2:** the interview was conducted on September 30, 2025, and lasted approximately 1 hour and 30 minutes. The expert expressed initial concern that the model has many dimensions, which may make it difficult for the university to prioritize what matters. In this sense, she recommended studying the weighting, to which the author suggested correlation analysis as future work to support such a study.

As for the definitions presented for each subdimension, they were considered sufficient and no adjustments were proposed. However, the expert took the opportunity to reinforce that "there is no innovation without entrepreneurship", and that it is always necessary to mention them together, emphasizing that they cannot be confused with research and development resources. She also stated that there must be a commitment, even an ethical one, on the part of the university to generate a positive impact, which implies training entrepreneurial individuals, teaching researchers to generate value, investing in new technologies, creating/generating startups, spin-offs, and spin-outs ("that's what makes the difference"), and empowering Technological Innovation Centers.

Regarding the indicators, the expert saw no obstacle to their classification according to their position in the value chain and commented that they are "excellent and complete": "I was concerned about giving too much weight to the final results of entrepreneurship

(...) and I saw that you included several indicators of materialization (...), not only of creating something new, but of executing, finding a market and transacting [intellectual property at the university]."

The expert recommended considering that the model could become a tool for measurement and comparison between universities and, for this reason, stated that it was important to add density to the indicators whenever possible (such as the number of startups per number of students and overall revenue per number of startups), explaining that this is how it becomes possible to find a fair yardstick and identify the size of the ecosystem: "there are small and medium-sized ecosystems, and large ones need to position themselves within a large-scale perspective. Everything must be benchmarked by the number of students, by the size of the university". In addition, the expert advised considering history and temporality in the indicators: "when we look at patent filings or the creation of startups, temporality is very important (...). How many spin-off companies were created in the last year, in the last three years, in the last five years? To have a benchmark and be fair to those who are growing their entrepreneurial activity in the present and future". These proposals by the expert regarding the indicators were incorporated by the author, as shown in [Appendix B](#).

Finally, the model was considered useful by the expert, who concluded by saying that "it represents what is finalistic, what is strategic, and what makes a difference in generating value for the market, creating companies, creating jobs (...)."

- **Expert 3:** the interview was conducted on October 4, 2025, and lasted approximately 2 hours. The expert recommended renaming "perspectives" to "categories" or "dimensions" or "groups", and "dimensions" to "subcategories" or "subdimensions" or "subgroups," to more accurately reflect the concepts of larger to smaller. The author opted for the terms "dimensions" and "subdimensions", as these are commonly found in the literature on PMS.

In addition, the expert advised changing the names of the dimensions "Governance and Direction" to "Governance and Ecosystem" and "Social Impact and Sustainability" to "Impact" to ensure cohesion and thematic relevance. The author accepted the

recommendation. The definitions presented for each subdimension were considered sufficient, and no adjustments were proposed.

Moreover, the expert recommended redistributing and renaming some subdimensions, namely: integrating the subdimension "collaborative innovation networks" into the Governance and Ecosystem dimension; renaming the subdimension "commitment to environmental protection and sustainability" to "environmental impact"; renaming the subdimension "leadership and specialized human resources" to "specialized human resources" (since leadership is reflected in the subdimension "structure") and redistributing it to the Tangible Enablers dimension (as it represents a tangible means that enables the university to operate); split the subdimension "extension" into two subdimensions: "extension", which refers to university student training activities and integrate it into the Entrepreneurial Training and Experience dimension, and "social impact", which corresponds to dialogue with society seeking its development and, therefore, keep it in the Impact dimension. Finally, the expert recommended to break down what was related to research that was covered in "collaborative innovation networks" into a new subdimension (the author chose to call it "scientific and technological research", as this is the term used by university rankings to measure this perspective) and insert it into the Entrepreneurial Training and Experience dimension, with the aim of representing the inseparable university triad of teaching, research and extension. All of these proposals by the expert were fully incorporated by the author, who – due to these adjustments – also chose to combine the subdimensions "entrepreneurial teaching" and "entrepreneurial practice" into "entrepreneurship teaching and practice", by renaming the subdimension "university knowledge exploration activities" to "economic impact" and integrating it into the Impact dimension, as well as choosing to exclude the Ecosystem, Transfer and Applied Research dimension, since its two subdimensions were reallocated in the model.

Regarding the classification of indicators according to their position in the value chain, which breaks them down into effort indicators (inputs, execution and efficiency) and outcome indicators (efficacy and effectiveness), the expert suggested considering a "middle ground" to facilitate understanding for non-researchers and non-academics. The author chose to maintain the original classification, as this classification retains the essence initially desired of presenting the "multiple aspects to be considered in the

dimensions of effort and result”, as stated by Brasil (2018, p. 12). In addition, the expert emphasized that the indicators should be considered from the perspective of their applicability and ease of collection, which enables the university to create a historical series for monitoring.

The expert also considered that the characteristics inherent to a public HEI are different from those inherent to a private HEI and a community HEI, and that it would be relevant to identify which one would best respond to the model. Considering that, in this research, the practical application of the model was carried out exclusively in Brazilian federal public universities, the author suggests, for future work, that the PMS also be tested in private HEIs and community HEIs, as well as in HEIs from other countries.

Finally, the model was considered useful by the expert, who sees it functioning as a data repository, capable of synthesizing and consolidating relevant performance and management indicators for universities' responses to various rankings – which would facilitate this task, that consumes a reasonable amount of managers' time.

Thus, the final PMS model, after validation by experts and incorporation of adjustments, is structured in four dimensions (then called perspectives) and thirteen subdimensions (then called dimensions), as shown in Figure 26.

Figure 26. Structure of the PMS model for entrepreneurial universities



Source: author.

[Appendix B](#) presents commonly used indicators for each dimension and subdimension of the PMS, also considering the findings of Corrêa (2022). This is an illustrative and non-exhaustive list, which was also validated by the experts consulted, as mentioned above. To standardize the presentation of indicators in the aforementioned Appendix, the number of indicators was limited to three per position in the value chain, totaling 195 indicators, with fifteen for each of the thirteen subdimensions: nine effort indicators (inputs, execution and efficiency) and six outcome indicators (efficacy and effectiveness).

4.1 GUIDELINES FOR USING THE MODEL

This section provides guidance on using the model, emphasizing that the premise for applying the PMS is that the university pursues entrepreneurship as an institutional strategy and directs its efforts toward achieving this mission.

Each HEI should assess its reality and context in order to verify whether the quality attributes, as defined by Uchoa (2013, see item [3.1.1.1](#)), will be fulfilled for the indicators proposed here (see [Appendix B](#)). Seeking to assist in the attribute of methodological reliability, some methods for collecting the model indicators are also proposed.

Initially, it is recommended that someone be designated at the level of the Dean's/President's Office to collect the necessary data, beginning with the analysis of institutional documents. For qualitative indicators, evidence can be found in the statutes, internal regulations, activity flowcharts and organizational charts, for example, and, therefore, should reflect what Clark (1998) called the entrepreneurial steps of university transformation: integrated entrepreneurial culture, committed core, stimulated academic heart, strong integration into the surrounding community, and diversification of revenue sources. Furthermore, the mission, vision, values and entrepreneurial strategy must be considered in the preparation of the Institutional Development Plan (*Plano de Desenvolvimento Institucional*, PDI in Portuguese), since it is the guiding principle for university planning and management, commonly for a period of five years.

For quantitative indicators that are not mentioned in institutional documents, it is recommended that the designated representative of the Dean's/President's Office collect data by administering questionnaires and/or conducting interviews with managers of the university's academic and administrative units. It should be noted that the results of some indicators (especially those

related to scientific production and intellectual property) come from external sources, such as Web of Science, InCites, Altmetric and WIPO.

Based on the evidence collected, an action plan should be established to achieve the indicators that are not yet monitored or have not been met. The action plan should define activities, responsible parties and deadlines, and should be integrated into the university's Tactical and Operational Plan (or *Plano Tático e Operacional*, PTO in Portuguese). Monitoring should be continuous, and periodic control meetings (e.g., quarterly) should be held between the Dean's/President's Office and the managers of the respective indicators.

Finally, [Annex C](#) presents examples of good practices recommended by the OECD and the European Commission for entrepreneurial universities, which can serve as inputs for the development of an action plan to meet the indicators of the PMS model.

4.2 POTENTIAL GAINS FROM THE APPLICATION OF THE PMS

It should be reiterated that this PMS is aimed at entrepreneurial universities, and the experts' assessment made it possible to rename the perspectives into dimensions and the dimensions into subdimensions, with a view to greater clarity of the concept from largest to smallest (it was said that the previous nomenclatures did not reflect this idea well); rename and redistribute the subdimensions in each dimension, in order to ensure cohesion and thematic relevance to each of them; in addition to adjusting some indicators to reflect issues of density and temporality, preserving their usefulness to decision makers and ease of data collection, so as to allow the university to create a historical series for monitoring.

Expert 3 understood that the model would be useful as a data repository, capable of synthesizing and consolidating relevant performance and management indicators for universities' responses to various rankings, which would facilitate this task, that consumes a reasonable amount of managers' time. Expert 2 stated that the indicators are capable of “representing what is finalistic, what is strategic, and [the model] makes a difference in generating value for the market, creating companies, and creating jobs”. Corroborating this understanding, Expert 1 stated that the model was coherent and that the proposal of indicators represented a “beautiful contribution to the area”.

The main objectives of the model are:

- To define parameters that enable HEIs to self-assess, presenting a path through which it is possible to monitor and improve their entrepreneurial performance:

Article 207 of the Brazilian Federal Constitution of 1988 stipulates that universities are governed by the principle of the inseparability of teaching, research and extension. To fulfill this third mission of contributing to regional/national development, in cooperation with society, the main means is academic entrepreneurship. The role of universities as economic agents is strengthened by entrepreneurial strategies and the creation of innovation parks and scientific centers, which connect HEIs to the productive sector.

By exploring commercialization activities that allow them to consider new sources of funding, such as patents, contract research and partnerships with private companies, entrepreneurial universities are less dependent on public funding, enabling them to increase the resources needed for academic investments and to boost innovation in administrative processes.

By using the PMS model to understand the dimensions, subdimensions and indicators that influence entrepreneurial performance, HEIs can conduct a diagnosis of themselves to define an archetype of an entrepreneurial university according to the variation of third mission activities in their portfolio.

For those universities that are not yet mature in terms of academic entrepreneurship, the model serves as a basis for pursuing this new strategic path, as a starting point from which to induce change. The PMS acts as a roadmap for HEIs to correct deviations, allowing them to identify and measure what may require little effort to implement but yield significant results – and start there.

- Improving HEI decision-making processes and practices:

The integrated set of dimensions, subdimensions and indicators in the model promotes control and accountability by quantifying actions and focusing on the entire value creation process, evaluating the HEI as a whole. The PMS allows entrepreneurial universities to determine

performance measures to support decision-making and organizational learning, connecting students, faculty and staff around the entrepreneurial agenda.

By providing relevant data and up-to-date information, PMS provides a better understanding of cause-and-effect relationships and improves governance by assessing the progress of activities, identifying inefficiencies in processes and reducing guesswork and risks.

- Improving HEI positions in national and international university entrepreneurship rankings:

By improving its entrepreneurial performance, the university can improve its ranking in university rankings in general – since the performance indicators in question are cross-cutting – and in particular in those related to entrepreneurship. Rankings have been the subject of pressure from social segments linked to demands for innovation and technology, as well as from governments, whose performance-based systems direct investment precisely to universities that are already well-positioned, with the aim of further improving their ranking. Therefore, obtaining this “seal of quality” not only increases the HEI’s ability to “sell itself” in the global education market, but also guarantees financial support for the execution of its institutional planning.

5 RESULTS AND DISCUSSION

The following sections and subsections present the evidence identified from the indicators in [Appendix B](#) for each university under analysis. Those that do not appear are due to the fact that no explicit evidence was identified. However, during data collection, other relevant indicators were identified, which are listed in the respective subsection.

5.1 FEDERAL UNIVERSITY OF VIÇOSA (UFV)

Founded in 1922 as the Higher School of Agriculture and Veterinary Medicine (ESAV), it became a university in 1969. It consists of three campuses, all in Minas Gerais, with a total of more than 20,000 students enrolled in undergraduate and graduate courses: Viçosa Campus (headquarters), located in the city of the same name; Florestal Campus and Rio Paranaíba Campus, located in the cities of the same name.

The main sources used to collect UFV data were its scores for each indicator in the 2021 RUE, the 2024 Management Report (UFV, 2025), the 2024-2029 Institutional Development Plan (UFV, 2024), and the institutional website (ufv.br). The following subsections present UFV's evidence for the dimensions and subdimensions of the model. Note: the square marker represents indicators from the model, while the round marker represents indicators present in the 2021 RUE.

5.1.1 Governance and Ecosystem Dimension

Analyzing the Governance and Ecosystem dimension (Chart 37), it appears that UFV has demonstrated institutional maturity, with an Innovation Policy approved since 2018, a mission of innovation and entrepreneurship officially stated in university documents, in addition to multiple programs and initiatives from the Viçosa Regional Development Technology Center (CenTev, incubator), the Viçosa Technology Park (tecnoPARQ), the Center for Social and Educational Development (Nudese, focused on social entrepreneurship) and the Junior Enterprise Center (Cemp). In addition, it has demonstrated partnerships with foreign universities and internationalization actions.

Chart 37. UFV evidence for Governance and Ecosystem subdimensions

Structure	UFV
<ul style="list-style-type: none"> ▪ Existence of an entrepreneurship professor position 	Professors act as advisors and supervisors in junior companies, contributing to the entrepreneurial training of students (UFV, 2024). According to the university's website, there are at least four professors working in the area of undergraduate entrepreneurship.
<ul style="list-style-type: none"> ▪ Existence of an Innovation Policy, in accordance with national, state, and municipal legislation on innovation and entrepreneurship 	Approved by Resolution No. 20 of the Collegiate Bodies Secretariat, dated December 14, 2018. The policy is managed by the Permanent Intellectual Property Commission, established as the University's NIT.
<ul style="list-style-type: none"> ▪ Existence of a structure that coordinates the entrepreneurial agenda within the institution and with other stakeholders within the local ecosystem 	<ul style="list-style-type: none"> - Viçosa Technology Park (tecnoPARQ), with the Startup, Business, Open Innovation, and Services programs. - The Junior Enterprise Center (Cemp) is responsible for operating the tecnoPARQ Junior Program, which disseminates the culture of entrepreneurship and fosters startups and spin-offs. In 2024, 1,330 projects developed by 45 junior companies at UFV were executed, with revenues of R\$1,070,727.50 (UFV, 2024). - The Social and Educational Development Center (Nudese) coordinates tecnoPARQ Social, focused on the implementation of educational, cultural, sports, and social programs, impacting approximately 1,720 people (UFV, 2024). - The Viçosa Regional Development Technology Center (CenTev) was created in 2001 and carries out awareness-raising and entrepreneurial training

	activities. It is a national reference in innovation and entrepreneurship and became the first incubator in Minas Gerais to obtain Cerne 4 certification, the highest level of the incubator management model developed by the National Association of Entities Promoting Innovative Enterprises (Anprotec) in partnership with Sebrae, joining a select group of only 10 incubators throughout Brazil (UFV, 2025).
<ul style="list-style-type: none"> ▪ Existence of actions that promote multidisciplinary connection, such as collaborative planning by teachers and the use of active teaching methodologies 	The Dean of Education promotes teacher training with a focus on sharing pedagogical strategies, reflection, and discussion of successful practices. The courses encourage multidisciplinary teamwork and the development of skills such as communication, ethics, and social responsibility (UFV, 2024).
<ul style="list-style-type: none"> ▪ Existence of actions that promote access to information, such as awareness campaigns on rights and duties, and the availability of data about the university in an open and accessible format 	According to UFV (2024) and UFV (2025), the Ombudsman's Office offers guidance channels and disseminates institutional information, promoting social control. In 2024, 363 protocols were received via the Fala.BR Platform. The university is among the top institutions in the Active Transparency ranking. The Open Data Plan (PDA 2023-2025) and the Open Data Portal are available. Events and workshops on data governance and transparency were offered.
<ul style="list-style-type: none"> ▪ Existence of mechanisms that encourage university participation in decision-making, such as the use of digital participation platforms, the creation of collegiate bodies, and the promotion of spaces for debate between the academic community and management 	The Teaching, Research, and Extension Council (Cepe) and other collegiate bodies have a pluralistic composition, including representatives of faculty, technical staff, and students (UFV, 2024). The Fala.BR Platform is used for community demonstrations, with standardized procedures and monitoring by the Ombudsman. The university also has interactive panels for transparency and social participation (UFV, 2025).
<ul style="list-style-type: none"> ▪ Existence of knowledge management practices at the university, such as community of practice, skills and competencies matrix, knowledge map, taxonomy, and lessons learned 	Process management and risk mapping are carried out by the Ombudsman's Office and the Institutional Governance Office (UFV, 2025), but there are no details on knowledge management practices.
<ul style="list-style-type: none"> ▪ Process processing time 	The average response time to complaints via the Ombudsman's Office was 19 days, and for requests for information via the Citizen Information Service (SIC) was 13 days (UFV, 2025). There are no details on the processing times for other processes/sectors.
Strategy	UFV
<ul style="list-style-type: none"> ▪ Presence of the entrepreneurial mission in the university's Institutional Policy 	There is explicit reference to innovation in the institutional mission and vision. UFV's institutional mission includes promoting innovation and educating citizens for sustainable and inclusive development, integrating teaching, research, and extension. The vision is to be a national and international reference in teaching, research, extension, and innovation, recognized as a promoter of sustainable development and social inclusion (UFV, 2024).
<ul style="list-style-type: none"> ▪ Definition of the entrepreneurial university archetype according to the main driver of the HEI, based on the variation of activities in the third mission in its portfolio: Research-oriented Entrepreneurial University, Technical Entrepreneurial University (industry-oriented), Innovation and Services-oriented Entrepreneurial University, or Commercial Entrepreneurial University (knowledge commercialization-oriented) 	It can be said that UFV positions itself as an entrepreneurial university oriented towards innovation and services, with a strong emphasis on (UFV, 2024): <ul style="list-style-type: none"> - Innovative technology-based entrepreneurship. - University-business interaction for knowledge and technology transfer. - CenTev and tecnoPARQ offer incubation, acceleration, residency programs, and innovation environments.
<ul style="list-style-type: none"> ▪ Number of academic mobility programs created 	According to UFV (2024):

	<ul style="list-style-type: none"> - Intercampus, National, and International Mobility: between 2018 and 2023, 326 students participated in mobility programs, and the university received 205 foreign students from 39 countries. - Participation in the Promover-Andifes Program (virtual mobility). - Strategic planning for internationalization includes a Memorandum of Understanding (MoU) with international entrepreneurship environments (goal: 8 by 2029).
<ul style="list-style-type: none"> ▪ Number of commitments established in the internationalization strategy that reflect the university's entrepreneurial goals 	<p>According to UFV (2024) and UFV (2025):</p> <ul style="list-style-type: none"> - Capes Institutional Internationalization Program (PrInt): internationalization of graduate studies, research networks, faculty/student mobility, and strengthening of applied research. - Softlanding Hub and Cross Acceleration at tecnoPARQ, with Enrich Brazil certification, for attracting foreign companies, and integration into global innovation networks.
<ul style="list-style-type: none"> ▪ Existence of objectives related to the promotion of entrepreneurship, partnerships, intellectual property production, technology transfer, and service provision 	<p>Strategic goals until 2029 (UFV, 2024):</p> <ul style="list-style-type: none"> - Double the number of startups supported (from 42 to 84). - Double the number of incubated companies (from 15 to 30). - Increase to 36 companies in residency programs. - Increase technology transfer contracts by 20%. - Expand junior company projects (from 1,330 to 1,600). - Expand international partnerships and acceleration programs.
<ul style="list-style-type: none"> ▪ Existence of objectives related to knowledge transfer and the development of social commitment 	<p>According to UFV (2024):</p> <ul style="list-style-type: none"> - Nudese and tecnoPARQ Social: social projects, technical training, social entrepreneurship. - Extension Policy: integration of teaching-research-extension, curricularization of extension (minimum 10% of the workload). - Social responsibility: projects for digital inclusion, public health, rural development, sustainability, and combating inequalities
<ul style="list-style-type: none"> ▪ Existence of institutional commitment to the exchange of knowledge with society, industry, and the public sector 	<p>According to UFV (2025):</p> <ul style="list-style-type: none"> - Cerne 4 certification for the CenTev incubator. Through its Incubation Program, it supported 17 companies in 2024, which achieved a turnover of R\$3.6 million, generated R\$254,575.32 in municipal, state, and federal taxes, and created 115 jobs. Through its Residency Program, it supported 23 companies, 11 of which were graduate companies that went through the Incubation Program and recorded revenues of approximately R\$102 million, generated about R\$4.2 million in taxes (municipal, state, and federal), and created 596 jobs. - Revenue of companies linked to CenTev (incubated, resident, and active graduates) in 2024: R\$140 million, with 990 jobs generated.
Collaborative innovation networks	UFV
<ul style="list-style-type: none"> ▪ Inclusion of business professionals and social leaders in the development and delivery of the curriculum, to change cultural norms that discourage entrepreneurship and innovation 	<p>According to UFV (2024), there is a need to engage with the productive sector and partnerships with companies for innovation and entrepreneurship, but there is no reference to this practice.</p>
<ul style="list-style-type: none"> ▪ Existence of actions with people outside academia to bring in skills that are not available internally 	<p>According to UFV (2024), partnerships with companies, public agencies, and civil society are planned for</p>

	innovation and extension projects, but there are no details on specific actions to fill internal skill gaps.
<ul style="list-style-type: none"> ▪ Participation of the HEI as a member of regional university innovation clusters 	According to UFV (2024), integration with regional innovation ecosystems and the strengthening of CenTev/tecnoPARQ are sought, but there is no formal mention of regional clusters.
<ul style="list-style-type: none"> ▪ Number of links with international networks 	According to UFV (2025): <ul style="list-style-type: none"> - Participation in programs such as PILA and UNITA, but without specifying the total number of links. - Consolidation of the International Laboratory for Research in Food Science and Biotechnology (SAMBA) between UFV and the University of Lille, France. - Implementation of the Brasilesia Cross-Acceleration Program, which supported 17 startups, 11 Polish and 6 Brazilian. Brasilesia is the result of the establishment of an MoU between tecnoPARQ/CenTev and the University of Silesia, promoting integration between the business ecosystems of Brazil and Poland (UFV, 2025).
<ul style="list-style-type: none"> ▪ Number of institutional representations within the ecosystem 	According to UFV (2024), institutional presence in innovation environments is expected to strengthen, but without specifying current numbers.
<ul style="list-style-type: none"> ▪ Number of companies graduated from incubation processes 	Three companies graduated from tecnoPARQ in 2024 (UFV, 2025).
<ul style="list-style-type: none"> ○ Number of international partnerships per 1,000 students at the HEI 	Score 2.91 (RUE 2021).
Proximity between HEI and market: <ul style="list-style-type: none"> ○ Number of incubated companies per 1,000 students at the HEI ○ Number of partnership agreements per 1,000 students with a multiplier factor proportional to the total value of the agreements (in reais) ○ Existence of NIT 	Score 3.77 (RUE 2021).

Source: author.

5.1.2 Tangible Enablers Dimension

In the Tangible Enablers dimension (Chart 38), it is noted that UFV's CenTev/tecnoPARQ took its first steps in the late 1990s and was formalized in 2001. Today, it is a national reference in innovation and entrepreneurship due to its Cerne 4 certification, the highest level of the incubator management model. This journey of more than twenty years in activity exemplifies the importance of starting to put the entrepreneurial agenda into practice early on, as excellence in management and high-impact results in a global scenario do not come instantly.

Chart 38. UFV evidence for Tangible Enablers subdimensions

Finance	UFV
<ul style="list-style-type: none"> ▪ Scholarships and financial aid for students in vulnerable economic situations 	12,000 students were assisted by the National Student Assistance Program (Pnaes) in 2024, including food, housing, health, digital inclusion, and support for foreigners through the Milton Santos Project for Access to Higher Education (Promisaes). There was also a supplement to resources due to the insufficiency of

	Pnaes, with an additional contribution of R\$ 4 million (UFV, 2025).
<ul style="list-style-type: none"> ▪ Existence of bonuses or promotions associated with knowledge transfer and the exploitation of opportunities 	There are support policies via public notices and incubation programs, but not as a mechanism for functional progression (UFV, 2024; UFV, 2025).
<ul style="list-style-type: none"> ○ Total budget divided by the number of students 	Score 6.03 (RUE 2021).
Technology and innovation infrastructure	UFV
<ul style="list-style-type: none"> ▪ University's willingness to facilitate the creation of technology and innovation infrastructure 	Sets goals to expand innovation environments, strengthen CenTev and tecnoPARQ, support startups, spin-offs, and technology-based companies, and increase partnerships with international innovative entrepreneurship environments by 2029 (UFV, 2024).
<ul style="list-style-type: none"> ▪ Number of innovation and entrepreneurship actions carried out virtually 	There is virtual mobility through the Latin American Academic Exchange Program (PILA) and Universitas Montium (UNITA) international programs, but there are no details on innovation or entrepreneurship actions carried out online (UFV, 2025).
<ul style="list-style-type: none"> ▪ Level of use of digital technologies for university development 	<ul style="list-style-type: none"> - Expansion of distance learning, creation of online courses, use of PVANet Moodle in 85% of subjects, digitization of the academic collection, and modernization of teaching laboratories. It also includes goals to expand digital educational resources and implement integrated management systems (UFV, 2024). - Implementation of the Information Technology Master Plan (PDTI) with an investment of R\$ 8 million, recovery of 1,300 pieces of equipment, and improvement in the IT governance index to 92% of requirements met (UFV, 2025). - Appointment of an IT ambassador to represent the university at the Santos Dumont supercomputer, one of the largest in Latin America in High-Performance Computing, located at the National Laboratory for Scientific Computing (UFV, 2025).
<ul style="list-style-type: none"> ▪ Existence of a learning environment adapted to a global audience 	<p>No global environments are specified, but there are internationalization goals and actions that indicate adaptation for a global audience, such as (UFV, 2024):</p> <ul style="list-style-type: none"> - Offer courses in English (goal: 6 in undergraduate programs and 72 in graduate programs by 2029). - Increase academic mobility and the number of foreign students.
<ul style="list-style-type: none"> ○ Quality of infrastructure: assessment of students' perception of the physical infrastructure and the availability and speed of the internet at the HEI 	Score 8.28 (RUE 2021).
<ul style="list-style-type: none"> ○ Technology park: sum of indicators for the installation of a technology park in the city where the HEI is located and the existence of a partnership, association, or agreement between the institution and the city's technology park 	Score 10.00 (RUE 2021).
Specialized human resources	UFV
<ul style="list-style-type: none"> ▪ Existence of a formal career development policy for all employees that addresses the entrepreneurial agenda 	No formal policy addressing the entrepreneurial agenda was identified, but the university has encouraged its students, professors, and technicians to develop entrepreneurial skills to contribute not only to professional success but also to the progress of the nation (UFV, 2024). Result of 0.97 out of 1 achieved in the iGovPub indicator of the Environmental, Social and Governance (ESG) Index, iESGo 2024, established by the Federal Court of Accounts (TCU), which measures Leadership, Strategy, and Control (UFV, 2025).

▪ Number of CNPq productivity scholarship recipients	According to UFV (2025), the university had 60 researchers awarded CNPq productivity scholarships in 2024, totaling 230 productivity scholarship researchers.
▪ Number of specific international recruitment initiatives	There are internationalization goals, such as establishing joint international programs, doubling dual degrees, and attracting foreign students (UFV, 2025), but there is no reference to formal strategies for international recruitment of faculty or technical staff.
▪ Existence of a system of rewards/recognition/awards for faculty and technical staff engaged in innovative initiatives	There is support for innovation and entrepreneurship projects through calls for proposals and programs, such as CenTev and tecnoPARQ (UFV, 2024; UFV, 2025), but not as a policy of individual recognition of employees.
○ Faculty entrepreneurial attitude: assessment of entrepreneurial characteristics present in IES faculty; faculty experience in the labor market and perception of faculty entrepreneurial attitude	Score 8.24 (RUE 2021).

Source: author.

5.1.3 Entrepreneurial Training and Experience Dimension

In the Entrepreneurial Training and Experience dimension (Chart 39), UFV's research, extension, teaching and entrepreneurship practices demonstrated diversity and depth, with an emphasis on student organizations and movements and international research, meeting the model's indicators. Support for innovative projects was detailed in terms of the number of companies, revenue achieved and hours of training, mentoring or advisory and consulting services, demonstrating maturity in the implementation of its entrepreneurial agenda.

Chart 39. UFV evidence for Entrepreneurial Training and Experience subdimensions

Teaching and practice of entrepreneurship	UFV
▪ Existence of specific programs on entrepreneurship	<p>According to UFV (2024) and UFV (2025), there are goals for creating and strengthening entrepreneurship and innovation programs:</p> <ul style="list-style-type: none"> - Pre-Incubation Program (2 editions), supporting 24 startups and offering 98 hours of training, 31 hours of mentoring, and 289 hours of advisory and consulting services, impacting 75 participants. - Innovation Link Program for university-business interaction. - Softlanding Hub and Cruzada Brasilesia Acceleration international programs. - Market Pull and Technology Push Acceleration Programs (5th edition of tecnoPARQ Acelera). - tecnoFARM Acelera program (1st edition), which supported 70 startups, providing 280 hours of training, 92 hours of mentoring, and 318 hours of advisory services, impacting more than 233 people. - Associated Company Program, which, in 2024, supported 7 companies that achieved revenues of R\$ 6 billion, generated approximately R\$ 1.1 million in taxes, and created 3,750 jobs. Sixteen hours of advisory services were provided, benefiting 71.43% of the associated companies.

	- tecnoPARQ Services Program, for entrepreneurial training, with 16 hours of training and 25 hours of mentoring, benefiting an average of 55% of incubated companies.
<ul style="list-style-type: none"> ▪ Number of subjects that incorporate digital skills and abilities into the curriculum and learning outcomes 	<p>According to UFV (2025):</p> <ul style="list-style-type: none"> - Thematic subjects focused on artificial intelligence and robotics. - Acquisition and installation of NVIDIA's DGX A100 Artificial Intelligence platform. Designed to meet all artificial intelligence demands, the system has a capacity equivalent to the processing power of approximately 100,000 conventional computers. - <i>Lato sensu</i> specialization in robotics. - Seminar on the use of Artificial Intelligence in academic activities. <p>There are goals for (UFV, 2024):</p> <ul style="list-style-type: none"> - Digital education: increase digital citizenship actions by 100%. - Use of PVANet Moodle in 85% of subjects. - Expansion of digital educational resources.
<ul style="list-style-type: none"> ▪ Number of courses on intellectual property, innovation, and entrepreneurship 	Entrepreneurship course (ADE327, 60 hours).
<ul style="list-style-type: none"> ▪ Percentage of shared/joint degrees 	There is no specific data on shared/joint degrees, but according to UFV (2024), there is a goal to create six joint international graduate programs (master's and/or doctorate) and to double the number of double degrees by 2029.
<ul style="list-style-type: none"> ○ Curriculum assessment: contribution of the HEI's teaching methodology to the development of entrepreneurial skills; contribution of the course curriculum to the development of entrepreneurial skills; and flexibility in the curriculum for engagement in extracurricular activities 	Score 8.16 (RUE 2021).
<ul style="list-style-type: none"> ▪ Existence of guidance and connection with the entrepreneurial ecosystem through mentoring provided by the university and through access to incubators 	Strengthening of CenTev and tecnoPARQ, with incubation, pre-incubation, residency, acceleration, and soft landing programs, as well as partnerships with international innovation environments (UFV, 2025).
<ul style="list-style-type: none"> ▪ Number of actions to raise awareness and create entrepreneurial skills among students and staff 	According to UFV (2024), there are goals to expand digital citizenship and innovation actions. Events were held by CenTev/tecnoPARQ (UFV, 2025) – see below.
<ul style="list-style-type: none"> ▪ Number of lectures, round tables, and seminars held 	<p>According to UFV (2025), institutional and scientific events were held:</p> <ul style="list-style-type: none"> - 82 lectures on entrepreneurship and innovation for undergraduate and graduate classes. - 30 editions of the tecnoPARQ Open Doors event. - 9 editions of Divã Empreendedor. - 15th edition of the Inovar Seminar focusing on entrepreneurship and innovation. - Cycle 3 of the InovaLácteos System. - 6th edition of Avança Café. - 6th edition of Forest Insight.
<ul style="list-style-type: none"> ▪ Number of business idea contests, hackathons, and boot camps held 	Two tecnoPARQ hackathons were held, bringing together 120 participants and providing 46 hours of training, resulting in the creation of 20 business model projects (UFV, 2025).
<ul style="list-style-type: none"> ▪ Number of online activities held 	Virtual mobility in international programs (PILA and UNITA), but no specific number of online activities was reported (UFV, 2025).
<ul style="list-style-type: none"> ○ Number of student organizations and movements 	Grade 10.00 (RUE 2021).

Scientific and technological research	UFV
▪ Number of research projects	1,200 research projects in 2024, covering various areas of knowledge (UFV, 2025).
▪ Publications in international journals	2,800 scientific articles, 65% of which are in international journals (UFV, 2025).
▪ Total citations (Web of Science)	36,544 citations (9,526 publications from 2002 to 2025, average of 3.84 citations per item) (Web of Science, 2025).
○ Impact of scientific productions in online environments (obtained by the Altimetric platform)	Score 0.76 (RUE 2021).
Research (Web of Science/InCites):	
○ Number of citations per article	Score 0.98 (RUE 2021).
○ Volume of production per 1,000 students at the HEI	
○ Number of articles in international partnership compared to the number of articles produced by the HEI (Web of Science/InCites)	Score 7.37 (RUE 2021).
Extension	UFV
▪ Number of extension activities carried out in innovative environments	There is no specification of actions in innovation environments, but in 2024, there were 17 international extension activities in 11 countries in the Americas, Africa, Europe, and Asia (UFV, 2025).
▪ Number of conferences, lectures, public debates, and workshops organized for non-academic institutions	There is no specific count for non-academic institutions, but institutional and scientific events were held – see the “entrepreneurial practice” dimension (UFV, 2025).
▪ Number of cultural and artistic activities supported by the university	126 cultural events on the three campuses (UFV, 2025).
▪ Number of actions for public communication of science in collaboration with other HEIs and public institutions, through writing articles for newspapers, interviews for online media, TV programs, podcasts	14 outreach actions at events (UFV, 2025), but without a specific count.
○ Number of extension activities registered at the HEI (programs, projects, courses, events), divided by the number of students	Score 5.88 (RUE 2021).
Students and alumni	UFV
▪ Graduation rate	Sets goals to increase the completion rate and reduce dropout rates (UFV, 2024; UFV, 2025) but does not provide figures.
▪ Retention rate	Sets goals to increase completion rates and reduce dropout rates (UFV, 2024; UFV, 2025) but does not provide figures.
▪ Proportion of international students	Sets a goal to increase the number of foreign students and create six joint international graduate programs (master's and/or doctorate) (UFV, 2024) but does not provide the current proportion.
○ Student entrepreneurial attitude: assessment of entrepreneurial characteristics present in HEI students; perception of students' entrepreneurial attitude and participation in the growth of an HEI project	Score 8.62 (RUE 2021).
○ Number of international exchanges carried out by the HEI, covering both the departure of HEI students abroad and the arrival of foreign students at the HEI, divided by the number of students	Score 1.06 (RUE 2021).

Source: author.

5.1.4 Impact Dimension

Finally, in the Impact dimension (Chart 40), UFV demonstrated compliance with the model's indicators, with a consolidated environmental strategy – recognized by the GreenMetric international ranking and the Environmental, Social, and Governance Index (iESGO) of the Federal Court of Accounts (TCU) – with waste management actions awarded by A3P and sustainability included in the curriculum. In addition, the university presented evidence of its economic impact through technology transfer – ranking among the largest patent filers in the country since 2014, according to the INPI ranking – and its social impact caused by academic engagement with the immediate environment, through programs, projects, courses and events, such as Innovation Day, within the scope of the Innovation Link Program, whose latest edition presented more than twenty solutions to meet the demands of local companies, promoting innovation and collaboration between academia and the productive sector.

Chart 40. UFV evidence for Impact subdimensions

Social impact	UFV
<ul style="list-style-type: none"> ▪ Existence of active prospecting for problems/opportunities in companies, the public sector, or society: yes, in a non-systematic way; no, in a systematic way; yes, in a systematic way 	There is a need to engage with companies, the public sector, and society for innovation and technology transfer (UFV, 2024), but this practice is not specified.
<ul style="list-style-type: none"> ▪ Ways of prospecting problems/opportunities in the immediate environment: events organized by the administrative unit, academic unit, or science and technology park; NIT events; researcher initiatives; response to calls for proposals; events organized by the Brazilian Industrial Research and Innovation Company (EMBRAPII) 	CenTev/tecnoPARQ events, participation in public notices, and NIT activities as mechanisms for interaction with companies and society. In 2024, seven public notices were launched for extension projects, five with own resources, one in partnership with Capes, and another with the Federal Public Ministry (UFV, 2024).
<ul style="list-style-type: none"> ▪ Number of proposals for real solutions to challenges from the ecosystem 	Seven editions of Innovation Day, part of the Innovation Link Program, which aims to promote university-business connections. More than 20 solutions were presented to meet the demands of companies, promoting innovation and collaboration between academia and the productive sector (UFV, 2025).
Economic impact	UFV
<ul style="list-style-type: none"> ▪ Intellectual property required 	In 2024, 41 patent applications were filed with the National Institute of Intellectual Property (INPI) and 24 definitive trademark registration certificates were obtained, in addition to 4 applications for registration of computer programs filed and registered (UFV, 2025). There are goals to increase patent applications by 15% and technology transfer contracts by 20% by 2029 (UFV, 2024).
<ul style="list-style-type: none"> ▪ Absolute percentage of patents granted 	10 patents granted out of 41 applications in the year (24%).
<ul style="list-style-type: none"> ○ Number of patents filed by the HEI over a ten-year period (extracted from WIPO > Patentscope) 	Grade 2.51 (RUE 2021).
Environmental impact	UFV
<ul style="list-style-type: none"> ▪ Existence of a publicly available strategy or policy on sustainable procurement and investment 	According to UFV (2025):

	<ul style="list-style-type: none"> - The Sustainable Logistics Management Plan (PLS) ended its first cycle in 2024, which began in 2021. - In iESGo 2024, it achieved the second highest rating among Federal Public Administration institutions and the second highest among IFES, obtaining 100% performance in environmental and social issues. - It joined the Public Administration Environmental Agenda (A3P). - It ranked 8th among IFES, 3rd among institutions in Minas Gerais, and 233rd in the UI GreenMetric world ranking (among the top 16% in the world, with 78.75% of the total possible points).
<ul style="list-style-type: none"> ▪ Existence of a research center focused on environmental sustainability 	There is no specific center for this purpose, but there are plans to strengthen programs and laboratories focused on sustainability (UFV, 2024).
<ul style="list-style-type: none"> ▪ Treatment and recycling of waste and residues at the university 	There are actions for solid waste management and recycling, in line with the university's environmental policy (UFV, 2024). It won first place in the 10th Best Sustainability Practices Award, promoted by A3P, in the category of proper waste management, with the Zero Waste program of Farmer's Week (UFV, 2025).
<ul style="list-style-type: none"> ▪ Programs for water conservation 	Programs for rational water use and maintenance of sustainable supply systems are planned (UFV, 2024).
<ul style="list-style-type: none"> ▪ Promotion of a green generation through education, research, and support activities 	There is a goal to include sustainability in the curriculum, support environmental research projects, and promote educational actions, such as "UFV + Sustentável" (UFV + Sustainable), a certification granted to university sectors that develop concrete actions in favor of sustainability (UFV, 2024).
<ul style="list-style-type: none"> ▪ Number of climate science and/or sustainability courses offered 	There are courses and programs related to sustainability (UFV, 2024), such as the Communication, Mobilization, and Engagement in Sustainability Program (PCMES), but no specific numbers are provided.

Source: author.

5.2 FEDERAL UNIVERSITY OF THE STATE OF RIO DE JANEIRO (UNIRIO)

Founded in 1969 as the Federation of Isolated Federal Schools of the State of Guanabara (FEFIEG), it became a university ten years later, in 1979. It consists of seven campuses, all located in the city of Rio de Janeiro, with a total of more than 11,000 students enrolled in undergraduate and graduate courses (2022 data): three campuses in the Urca neighborhood, two campuses in the Tijuca neighborhood, Botafogo Campus, and Downtown Campus.

The main sources used to collect UNIRIO data were its scores on each indicator of the 2021 RUE, the 2024 Management Report (UNIRIO, 2025), the 2022-2026 Institutional Development Plan (UNIRIO, 2021), and the institutional website (unirio.br). The following subsections present UNIRIO's evidence for the dimensions and subdimensions of the model. Note: the square marker represents indicators of the model, while the round marker represents indicators present in the 2021 RUE.

5.2.1 Governance and Ecosystem Dimension

When analyzing the Governance and Ecosystem dimension (Chart 41), it is clear that UNIRIO is in the process of structuring and developing its entrepreneurial agenda, with an Innovation Policy approved in 2023, the EMPREENDE incubator having been recently established, and the Board responsible for entrepreneurship and innovation still without a management position or bonus function, according to the organizational chart published on the institutional website and last updated on November 4, 2020. The university has demonstrated actions aimed at internationalization, such as through its participation in international cooperation networks like the International Cooperation Group of Brazilian Universities (GCUB) and the Ibero-American Network of Health Promoting Universities (RIUPS).

Chart 41. UNIRIO evidence for Governance and Ecosystem subdimensions

Structure	UNIRIO
<ul style="list-style-type: none"> Existence of an entrepreneurship professor position 	According to the university's website, there are at least two professors working in the field of entrepreneurship.
<ul style="list-style-type: none"> Existence of an Innovation Policy, in accordance with national, state, and municipal legislation on innovation and entrepreneurship 	Approved by Resolution No. 5645 of the Secretariat of Higher Councils, dated February 15, 2023. The policy must be reviewed every four years by the Office of the Dean of Graduate Studies, Research, and Innovation (PROPGPI).
<ul style="list-style-type: none"> Existence of a structure that coordinates the entrepreneurial agenda within the institution and with other stakeholders within the local ecosystem 	The Directorate of Technological, Cultural, and Social Innovation (DIT), which is part of PROPGPI, is the executive arm of the innovation/entrepreneurship agenda (UNIRIO, 2021). The EMPREENDE incubator (UNIRIO, 2025) is also part of the structure.
<ul style="list-style-type: none"> Existence of actions that promote multidisciplinary connection, such as collaborative planning by teachers and the use of active teaching methodologies 	Flexible curricula, new teaching methodologies, and participatory construction with Structuring Teaching Centers (NDEs) and collegiate bodies are planned, stimulating theory-practice integration and methodological updating. The Institutional Pedagogical Plan (PPI) reinforces interdisciplinarity as a principle for teaching (UNIRIO, 2021).
<ul style="list-style-type: none"> Existence of actions that promote access to information, such as awareness campaigns on rights and duties, and the availability of data about the university in an open and accessible format 	Use of websites and social networks to increase transparency and access to activities, events, and programs. The 2022-2024 Open Data Plan is available (UNIRIO, 2021).
<ul style="list-style-type: none"> Existence of mechanisms that encourage university participation in decision-making, such as the use of digital participation platforms, the creation of collegiate bodies, and the promotion of spaces for debate between the academic community and management 	There are collegiate bodies and decision-making bodies, as well as permanent commissions/committees (UNIRIO, 2021). The Center for Humanities and Social Sciences (CCH) reports monthly meetings of the Center Council open to the community (UNIRIO, 2025).
<ul style="list-style-type: none"> Existence of knowledge management practices at the university, such as community of practice, skills and competencies matrix, knowledge map, taxonomy, and lessons learned 	There are no details on knowledge management practices, but there are standardization services, catalogs, and tutorials that support knowledge management. There is a goal to monitor and feed technological platforms that enable the secure storage and dissemination of knowledge (UNIRIO, 2021).

Strategy	UNIRIO
<ul style="list-style-type: none"> ▪ Presence of the entrepreneurial mission in the university's Institutional Policy 	<p>There is no explicit reference to innovation or entrepreneurship in the institutional mission and vision.</p>
<ul style="list-style-type: none"> ▪ Definition of the entrepreneurial university archetype according to the main driver of the HEI, based on the variation of activities in the third mission in its portfolio: Research-oriented Entrepreneurial University, Technical Entrepreneurial University (industry-oriented), Innovation-oriented Entrepreneurial University and Services, or Commercial Entrepreneurial University (oriented towards the commercialization of knowledge) 	<p>It can be said that UNIRIO positions itself as an entrepreneurial university oriented towards innovation and services, with a strong emphasis on (UNIRIO, 2025):</p> <ul style="list-style-type: none"> - Programs to promote research and innovation: INOVA/2024 Call for Proposals, UNIRIO Researcher Program for Research Productivity (PPQ-UNIRIO), Researcher-Facility Program (PPIInst). - Creation of the EMPREENDE incubator and encouragement of technology transfer. - Patent filings (200% growth in 2024) and registrations granted (400% increase in that year).
<ul style="list-style-type: none"> ▪ Number of academic mobility programs created 	<p>According to UNIRIO (2025):</p> <ul style="list-style-type: none"> - Launch of the first call for applications for international mobility scholarships: Call for Applications from the Coordination of International and Interinstitutional Relations (CRI) 01/2024, with the award of 6 scholarship quotas for 14 selected students (10 effectively participated in an exchange program at the University of Coimbra). - Joining the PILA Program. - Participation in the MARCA Program (academic mobility between institutions in Mercosur member and associate countries). - Participation in the coordination of the Tordesillas Group in Brazil. This is a network of universities in Brazil, Portugal, and Spain for academic collaboration.
<ul style="list-style-type: none"> ▪ Number of commitments established in the internationalization strategy that reflect the university's entrepreneurial objectives 	<p>According to UNIRIO (2025):</p> <ul style="list-style-type: none"> - 95 cooperation agreements in force with 74 partner universities in 20 countries. - Memoranda of Understanding with institutions in Cuba, Argentina, Canada, the United States, among others. - Participation in networks such as the Brazilian Association of International Education (FAUBAI) and the Network of International Advisory Services of Higher Education Institutions in the State of Rio de Janeiro (REARI-RJ).
<ul style="list-style-type: none"> ▪ Existence of objectives related to the promotion of entrepreneurship, partnerships, intellectual property production, technology transfer, and service provision 	<p>Strategic goal until 2026 (UNIRIO, 2021): to develop a culture and practice of innovation and promote the protection of the University's intellectual production.</p>
<ul style="list-style-type: none"> ▪ Existence of objectives related to knowledge transfer and the development of social commitment 	<p>Strategic goal by 2026 (UNIRIO, 2021): promote exchanges with public and private entities, organizations, and social movements; and extend to society the benefits of cultural, artistic, scientific, and technological creation generated at the university.</p>
<ul style="list-style-type: none"> ▪ Existence of institutional commitment to the exchange of knowledge with society, industry, and the public sector 	<p>According to UNIRIO (2025):</p> <ul style="list-style-type: none"> - Partnerships with public agencies and companies, such as the Chico Mendes Institute for Biodiversity Conservation (ICMBIO), the Municipal Secretariat for Science and Technology, and the Rio de Janeiro State Research Support Foundation (FAPERJ). - Technological and social innovation projects, supported by the INOVA Call for Proposals and the EMPREENDE incubator. - Extension and cultural programs with social impact.

Collaborative innovation networks	UNIRIO
<ul style="list-style-type: none"> ▪ Existence of actions with people outside academia to bring in skills that are not available internally 	According to UNIRIO (2021), partnerships with public and private institutions and social movements are planned to support teaching, research, extension, and innovation activities, in addition to national and international agreements and technical cooperation agreements for continuing education and inclusion.
<ul style="list-style-type: none"> ▪ Participation of the HEI as a member of regional university innovation clusters 	There is no formal mention of regional clusters, but according to UNIRIO (2021), there are actions to strengthen partnerships with support foundations and innovation networks, such as the implementation of a coworking space, which was only partially completed (25%) due to low demand.
<ul style="list-style-type: none"> ▪ Number of links with international networks 	95 cooperation instruments in force, involving 74 partner universities in 20 countries. Participation in programs such as MARCA and Move La América (UNIRIO, 2025).
<ul style="list-style-type: none"> ▪ Number of institutional representations within the ecosystem 	Participation in national forums such as the Forum of Pro-Rectors of Graduate Studies and Research (FOPROP) and international cooperation networks such as the International Cooperation Group of Brazilian Universities (GCUB) and the Ibero-American Network of Health Promoting Universities (RIUPS).
<ul style="list-style-type: none"> ○ Number of international partnerships per 1,000 students at the HEI 	Score 0.09 (RUE 2021).
Proximity between HEI and market: <ul style="list-style-type: none"> ○ Number of incubated companies per 1,000 students at the HEI ○ Number of partnership agreements per 1,000 students with a multiplier factor proportional to the total value of the agreements (in reais) ○ Existence of NIT 	Score 2.87 (RUE 2021).

Source: author.

5.2.2 Tangible Enablers Dimension

In the Tangible Enablers dimension (Chart 42), the fact that UNIRIO does not have an established and consolidated science and technology park, and that the EMPREENDE business incubator is not yet complete, led to the university's lower performance. Despite having created the Multidimensional Laboratory for Innovation and Creativity at the Center for Exact Sciences and Technology (CCET) and planning to implement a coworking space, students' perceptions of the university's physical infrastructure and internet availability and speed show that these are areas for improvement.

Chart 42. UNIRIO evidence for Tangible Enablers subdimensions

Finance	UNIRIO
<ul style="list-style-type: none"> ▪ Scholarships and financial aid for students in situations of economic vulnerability 	According to UNIRIO (2025), in 2024: <ul style="list-style-type: none"> - 1,609 students will receive food assistance (R\$ 300/month). - 696 students with Academic Incentive Scholarships (BIA, R\$ 600/month).

	<ul style="list-style-type: none"> - 128 students with housing assistance (R\$ 600/month). - 11 indigenous/quilombola students with Permanence Scholarships (R\$ 1,400/month). - Among the measures approved for 2025 are full gratuity at the School Restaurant and an additional amount of R\$ 264.00 for courses without access to the restaurant.
<ul style="list-style-type: none"> ▪ Existence of bonuses or promotions associated with knowledge transfer and the exploration of opportunities 	There are initiatives to encourage innovation and entrepreneurship via the INOVA/2024 Call for Proposals and the EMPREENDE incubator, but there are no individual bonuses or salary promotions for civil servants (UNIRIO, 2025).
○ Total budget divided by the number of students	Score 3.05 (RUE 2021).
Technology and innovation infrastructure	UNIRIO
<ul style="list-style-type: none"> ▪ University's willingness to facilitate the creation of technology and innovation infrastructure 	There is a specific objective to ensure information technology infrastructure and equipment and improve digital governance, promoting the provision of digital services and social participation through digital means (UNIRIO, 2021). The Multidimensional Laboratory for Innovation and Creativity was created at the Center for Exact Sciences and Technology (CCET). The university also plans to implement a coworking space, and the EMPREENDE business incubator is partially complete (UNIRIO, 2025).
<ul style="list-style-type: none"> ▪ Number of innovation and entrepreneurship actions carried out virtually 	There are records of virtual internationalization actions, such as PILA Virtual, but without exclusive quantitative details (UNIRIO, 2025).
<ul style="list-style-type: none"> ▪ Level of use of digital technologies for university development 	<p>According to UNIRIO (2025):</p> <ul style="list-style-type: none"> - Implementation of the SEI (Electronic Information System) for 100% of administrative processes, eliminating paper processes. - Modernization of information and communication technology infrastructure, expansion of connectivity, updating of laboratories. - Launch of new portals and systems, in addition to maintaining platforms such as the Teaching Information System (SIE), Research Portal, Scholarship Portal, and integration with external platforms. - Expansion of the Horus Repository, a Central Library service for storing and disseminating academic production, and a 236% increase in digital deposits.
<ul style="list-style-type: none"> ▪ Existence of a learning environment adapted to a global audience 	<p>There is no explicit mention of an adapted global virtual environment or a consolidated structure for a global audience. However, according to UNIRIO (2025), there are internationalization initiatives:</p> <ul style="list-style-type: none"> - International Academic Mobility Notice (10 students sent to the University of Coimbra). - Adherence to the PILA Program, including virtual modality (Internationalization at Home). - There are plans to offer Portuguese as an additional language for foreigners and to encourage the offering of courses in virtual format.
○ Infrastructure quality: assessment of students' perception of the physical infrastructure and the availability and speed of the internet at the HEI	Score 6.21 (RUE 2021).
○ Technology park: sum of the indicators for the installation of a technology park in the city where the HEI is located and the existence of a partnership, association, or agreement between the institution and the city's technology park	Score 0.00 (RUE 2021).

Specialized human resources	UNIRIO
<ul style="list-style-type: none"> ▪ Existence of a formal career development policy for all employees that addresses the entrepreneurial agenda 	<p>Although there are continuing education and training initiatives for teachers, health professionals, public managers, and creative sectors, including the creation of the UNIRIO Extension School to coordinate training programs (UNIRIO, 2021), the entrepreneurial theme was not identified in the policy for the qualification and training of teachers and technicians.</p>
<ul style="list-style-type: none"> ▪ Number of specific international recruitment initiatives 	<p>There are internationalization actions, such as the Move La América Program, which aims to internationalize Brazilian graduate studies, attracting students from Latin America and the Caribbean to pursue sandwich master's or doctoral degrees in Brazil; Sandwich Doctorate Program Abroad (PDSE); PILA; agreements with foreign universities (UNIRIO, 2025), but there is no reference to formal strategies for the international recruitment of teachers or technicians.</p>
<ul style="list-style-type: none"> ▪ Existence of entrepreneurial qualifications for technical staff and faculty 	<p>There is the INOVA/2024 Call for Proposals and the EMPREENDE incubator, which support innovative projects developed by university faculty and technical staff, but not as a broad qualification policy for all employees. The main challenges involve budget constraints and the need for training in innovation and entrepreneurship. The university seeks to mitigate these risks through partnerships and support for intellectual property (UNIRIO, 2025).</p>
<ul style="list-style-type: none"> ▪ Existence of a system of rewards/recognition/awards for faculty and technical staff engaged in innovative initiatives 	<p>The INOVA/2024 Call for Proposals and the UNIRIO Researcher Program for Research Productivity (PPQ-UNIRIO) serve as mechanisms to encourage innovation and research (UNIRIO, 2025), but there is no formal institutionalized award or recognition system for innovation.</p>
<ul style="list-style-type: none"> ○ Faculty entrepreneurial attitude: assessment of entrepreneurial characteristics present in IES faculty; faculty experience in the labor market and perception of faculty entrepreneurial attitude 	<p>Grade 7.31 (RUE 2021).</p>

Source: author.

5.2.3 Entrepreneurial Training and Experience Dimension

In the Entrepreneurial Training and Experience dimension (Chart 43), although UNIRIO mentioned that the INOVA/2024 Call for Proposals supported innovative projects, no specific figures were identified, nor were any other specific programs on entrepreneurship identified. The university recognizes that there is a need for training in innovation and intellectual property. Although the Directorate of Technological, Cultural and Social Innovation (DIT), which is part of the Dean of Graduate Studies, Research and Innovation (PROPGPI), acts to support intellectual property, there is a need for greater encouragement of technology transfer. When considering the number of extension activities registered in relation to the number of students at UNIRIO, it became clear that there is potential for improvement.

Chart 43. UNIRIO evidence for Entrepreneurial Training and Experience subdimensions

Teaching and practice of entrepreneurship	UNIRIO
<ul style="list-style-type: none"> ▪ Existence of specific programs on entrepreneurship 	<p>According to UNIRIO (2025), the INOVA/2024 Call for Proposals supports innovative projects, and the EMPREENDE incubator accelerates the practical application of the solutions developed.</p>
<ul style="list-style-type: none"> ▪ Existence of training and consulting on industrial property 	<p>There is a need for training in innovation and intellectual property and for encouraging technology transfer. DIT/PROPGPI provides support for intellectual property (UNIRIO, 2025).</p>
<ul style="list-style-type: none"> ▪ Number of subjects that incorporate digital skills and abilities into the curriculum and learning outcomes 	<p>According to UNIRIO (2025):</p> <ul style="list-style-type: none"> - Computing and Computational Thinking Projects at the Center for Exact Sciences and Technology (CCET), such as Machine Teaching, Almanacs for the Popularization of Computer Science. - Updating of Course Pedagogical Projects (PPCs) to align with National Curriculum Guidelines (DCNs), including digital skills.
<ul style="list-style-type: none"> ▪ Number of intellectual property, innovation, and entrepreneurship courses 	<p>Entrepreneurship Course (TIN0130, 60 hours).</p>
<ul style="list-style-type: none"> ▪ Percentage of shared/joint degrees 	<p>There is no specific data on shared/joint degrees, but according to UNIRIO (2025), new co-tutelage and double degree agreements are expected in the context of the Move La América Program.</p>
<ul style="list-style-type: none"> ○ Curriculum assessment: contribution of the HEI's teaching methodology to the development of entrepreneurial skills; contribution of the course curriculum to the development of entrepreneurial skills; and flexibility in the curriculum for engagement in extracurricular activities 	<p>Score 6.53 (RUE 2021).</p>
<ul style="list-style-type: none"> ▪ Existence of guidance and connection with the entrepreneurial ecosystem through mentoring provided by the university and through access to incubators 	<p>There is the EMPREENDE incubator in the context of the INOVA/2024 program (UNIRIO, 2025). There is a strategic action to create a Coworking and Entrepreneurship Center, with a Coordination level (UNIRIO, 2021).</p>
<ul style="list-style-type: none"> ▪ Number of actions to raise awareness and create entrepreneurial skills among students and staff 	<p>According to UNIRIO (2025), there is a need for training in innovation and entrepreneurship. Innovation events were held, reaching the goal set by the university, but without specific quantitative information.</p>
<ul style="list-style-type: none"> ▪ Number of lectures, round tables, and seminars held 	<p>According to UNIRIO (2025), seminars were held to disseminate research, innovation, and extension, as well as academic events such as science and culture fairs. However, no specific count was reported. There is a projected target to be achieved by 2026 of holding 1,338 courses, events, seminars, conferences, lectures, and roundtable discussions (UNIRIO, 2021).</p>
<ul style="list-style-type: none"> ▪ Number of business idea competitions, hackathons, and boot camps held 	<p>Holding of two Innovation Olympics (UNIRIO, 2025).</p>
<ul style="list-style-type: none"> ▪ Number of online activities held 	<p>Increase in remote access and digital actions, such as the Election Portal and modernization of information and communication technologies, but no specific figures are provided (UNIRIO, 2025). There are in-person and virtual offerings in extension activities, without specifying quantities. There was an expansion of video lessons, live classes, and live streams during the pandemic and the creation of an extension teaching portal, but without specific metrics for online activities (UNIRIO, 2021).</p>
<ul style="list-style-type: none"> ○ Number of student organizations and movements 	<p>Score 5.10 (RUE 2021).</p>

Scientific and technological research	UNIRIO
<ul style="list-style-type: none"> ▪ Number of research projects 	807 research projects underway in 2024. The creation of startups based on research was below expectations (33%) (UNIRIO, 2025).
<ul style="list-style-type: none"> ▪ Publications in international journals 	1,002 articles published in journals, but no details on the international percentage (UNIRIO, 2025).
<ul style="list-style-type: none"> ▪ Total citations (Web of Science) 	3,130 citations (1,675 publications from 2002 to 2025, average of 1.87 citations per item) (Web of Science, 2025).
<ul style="list-style-type: none"> ○ Impact of scientific productions in online environments (obtained by the Altimetric platform) 	Score 0.21 (RUE 2021).
Research (Web of Science/InCites): <ul style="list-style-type: none"> ○ Number of citations per article ○ Volume of production per 1,000 students at the HEI 	Score 0.63 (RUE 2021).
<ul style="list-style-type: none"> ○ Number of articles in international partnership compared to the number of articles produced by the HEI (Web of Science/InCites) 	Score 4.32 (RUE 2021).
Extension	UNIRIO
<ul style="list-style-type: none"> ▪ Number of conferences, lectures, public debates, and workshops organized for non-academic institutions 	There are records of events and public hearings, and coordination with the Ministry of Culture to hold free and thematic conferences within the scope of the 4th National Conference on Culture (UNIRIO, 2025), but no specific figures are provided.
<ul style="list-style-type: none"> ▪ Number of cultural and artistic activities supported by the university 	Concerts, educational exhibitions, theatrical performances, festivals, and cultural projects such as "From the Periphery to the University" and "The Reader as Protagonist" are held, but there is no specific count.
<ul style="list-style-type: none"> ▪ Number of actions providing facilities for the external community 	There are plans for a policy on renting spaces to raise funds (UNIRIO, 2021).
<ul style="list-style-type: none"> ▪ Number of contributions to public policies 	Participation in public hearings (within the scope of interinstitutional projects) and representation in education forums, but without a specific count of contributions (UNIRIO, 2025).
<ul style="list-style-type: none"> ▪ Number of actions for public communication of science in collaboration with other HEIs and public institutions, through writing articles for newspapers, interviews for online media, TV programs, podcasts 	There is no specific count, but science popularization projects were carried out, such as Almanacs for the Popularization of Computer Science, and a radio/TV program by the School of Letters (UNIRIO, 2025).
<ul style="list-style-type: none"> ○ Number of extension activities registered at the HEI (programs, projects, courses, events), divided by the number of students 	Score 0.41 (RUE 2021).
Students and alumni	UNIRIO
<ul style="list-style-type: none"> ▪ Graduation rate 	According to UNIRIO (2021), the university uses the Graduation Success Rate (TSG, according to the TCU formula) indicator. Base year: 30% (2021). Targets: 32% (2022), 34% (2023), 36% (2024), 38% (2025), 40% (2026).
<ul style="list-style-type: none"> ▪ Retention rate 	There are support measures to reduce dropout/abandonment, such as the Special Tutoring Program (PROTES), but no specific rates are specified (UNIRIO, 2021).
<ul style="list-style-type: none"> ▪ Employability rate 	Graduates are monitored through the Joia Rara Program (PROJOIA), but no specific employability rate is provided.
<ul style="list-style-type: none"> ▪ Proportion of international students 	There is mention of the Undergraduate Student Agreement Program (PEC-G), which offers young people from developing countries the opportunity to attend higher education in Brazil free of charge, and international mobility, but there is no specific data on

	the proportion of international students (UNIRIO, 2021; UNIRIO, 2025).
o Student entrepreneurial attitude: assessment of the entrepreneurial characteristics present in HEI students; perception of the entrepreneurial attitude of students and their participation in the growth of any HEI project	Score 7.35 (RUE 2021).
o Number of international exchanges carried out by the HEI, covering both the departure of HEI students abroad and the arrival of foreign students at the HEI, divided by the number of students	Score 0.45 (RUE 2021).

Source: author.

5.2.4 Impact Dimension

Finally, in the Impact dimension (Chart 44), UNIRIO maintains a solar energy system on one of its campuses and has implemented sustainability initiatives, such as the Chemical Waste Management Program, in addition to projects and events, such as the Scientific Exhibition of the Institute of Biosciences (IBIO) and the International Meeting on School Food, Innovation and Sustainability. The university also participated in public hearings (within the scope of interinstitutional projects) and made representations in education forums. About cultural and artistic activities and actions to popularize science, there were relevant projects, such as "From the Periphery to the University" and "Almanacs for the Popularization of Computer Science".

Chart 44. UNIRIO evidence for Impact subdimensions

Social impact	UNIRIO
<ul style="list-style-type: none"> ▪ Existence of active prospecting for problems/opportunities in companies, the public sector, or society: yes, in a non-systematic manner; no systematic prospecting; yes, in a systematic manner 	<p>This practice is not specified, but there are internal calls for proposals such as INOVA/2024, whose selection process prioritizes topics relevant to society (UNIRIO, 2025).</p>
<ul style="list-style-type: none"> ▪ Ways of prospecting problems/opportunities in the immediate environment: events organized by the administrative unit, academic unit, or science and technology park; NIT events; researcher initiatives; response to calls for proposals; events organized by the Brazilian Industrial Research and Innovation Company (EMBRAPII) 	<p>Events at academic units, seminars, workshops, and conferences with the participation of internal and external researchers; Innovation Day (UNIRIO, 2021); internal calls for proposals, such as INOVA/2024 and IT-UNIRIO 2024; participation in networks such as GCUB, FAUBAI, and PILA (UNIRIO, 2025).</p>
<ul style="list-style-type: none"> ▪ Number of proposals for real solutions to challenges arising from the ecosystem 	<p>The INOVA/2024 Call for Proposals and the EMPREENDE incubator seek technological/social/cultural solutions with impact (with patents/products), but there is no consolidated counter (UNIRIO, 2025).</p>
<ul style="list-style-type: none"> ▪ Student internships in the region 	<p>About mandatory teaching internships, there has been an expansion of agreements with schools for supervised internships (undergraduate degrees), but without specifying that they be in the region (UNIRIO, 2025).</p>

Economic impact	UNIRIO
<ul style="list-style-type: none"> ▪ Intellectual property required 	Exceeding the patent filing target by 200% and a 400% increase in registrations granted (UNIRIO, 2025). Absolute figures are not presented.
<ul style="list-style-type: none"> ▪ Absolute percentage of patents granted 	UNIRIO (2025) cites a 400% increase in registrations granted, but absolute figures are not provided.
<ul style="list-style-type: none"> ○ Number of patents filed by HEIs over a ten-year period (extracted from WIPO > Patentscope) 	Note 0.23 (RUE 2021).
Environmental impact	UNIRIO
<ul style="list-style-type: none"> ▪ Existence of a publicly available strategy or policy on sustainable procurement and investment 	Adopts environmental criteria in tenders and contracts, prioritizing products with better energy efficiency and lower environmental impact. In 2024, the PLS was updated for the 2025-2026 period, in line with the UN SDGs (UNIRIO, 2025).
<ul style="list-style-type: none"> ▪ Existence of a research center focused on environmental sustainability 	There is no specific center for this purpose, but laboratories and multidimensional centers (teaching, research, and extension) develop projects related to sustainability, innovation, and the environment. The Center for Biological and Health Sciences (CCBS) works on health, nutrition, and environmental projects (UNIRIO, 2025).
<ul style="list-style-type: none"> ▪ Types of renewable energy generated locally (at the point of consumption or in the region), such as solar, wind, hydro, biomass, or geothermal energy 	It maintains a solar power generation system on one of the Urca campuses (Av. Pasteur, 436), with more than 800 photovoltaic modules and two inverters, generating 500,000 kWh/year and reducing electricity consumption by about 60% (UNIRIO, 2025).
<ul style="list-style-type: none"> ▪ Treatment and recycling of waste and residues at the university 	There is a Chemical Waste Management Program, with proper disposal by accredited companies. CCBS has signed a contract with a specialized company for the collection and disposal of laboratory waste (UNIRIO, 2025).
<ul style="list-style-type: none"> ▪ Promotion of a green generation through education, research, and support activities 	There are plans to include extension courses focused on environmental development in the curriculum (UNIRIO, 2021). There are extension projects and academic events that address sustainability, innovation, and the environment, such as the Scientific Exhibition of the Institute of Biosciences (IBIO) and the International Meeting on School Food, Innovation, and Sustainability (UNIRIO, 2025).
<ul style="list-style-type: none"> ▪ Number of climate science and/or sustainability courses offered 	There are courses and postgraduate programs that address sustainability, environmental health, and technological innovation (UNIRIO, 2021).
<ul style="list-style-type: none"> ▪ Employee perception of the university's commitment to climate change 	There are internal surveys for institutional diagnosis (UNIRIO, 2021), but there is no specific data on staff perceptions of climate change.

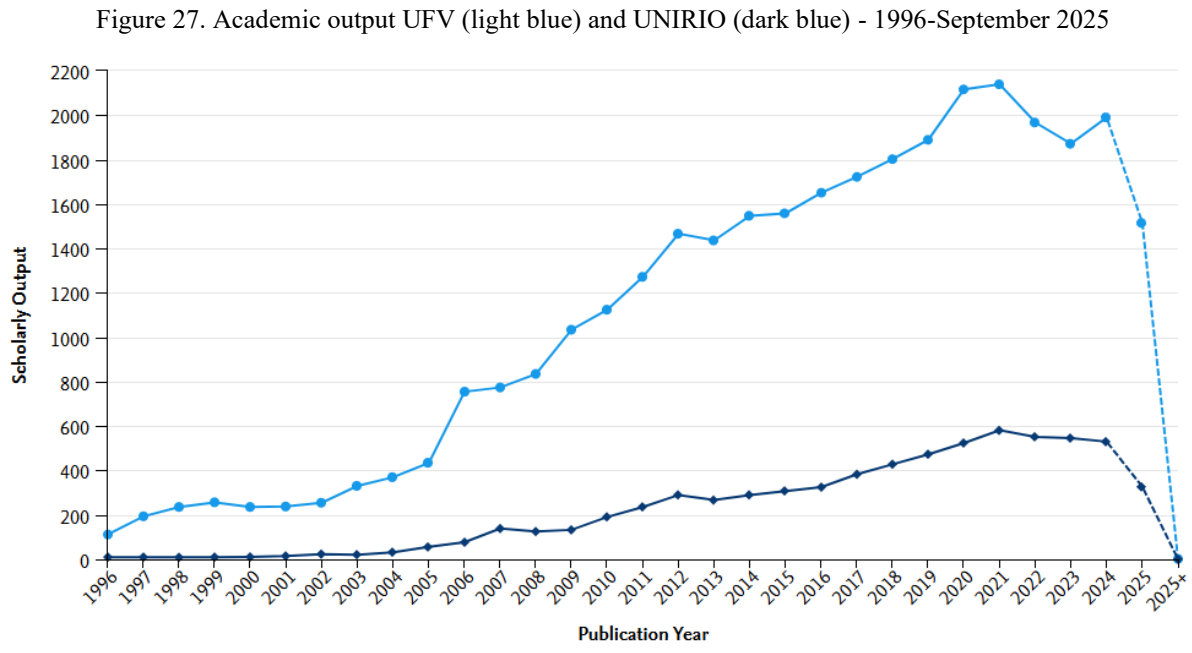
Source: author.

5.3 COMPARISON OF THE MODEL BETWEEN HEIs (CROSS-REFERENCING OF INFORMATION)

Using the SciVal platform (SciVal, 2025), the metrics available there and related to the PMS, were compared between the two HEIs. The results are shown in the following figures. The platform's metrics are related to the Governance and Ecosystem dimension and its subdimension "collaborative innovation networks"; as well as the Entrepreneurial Training and

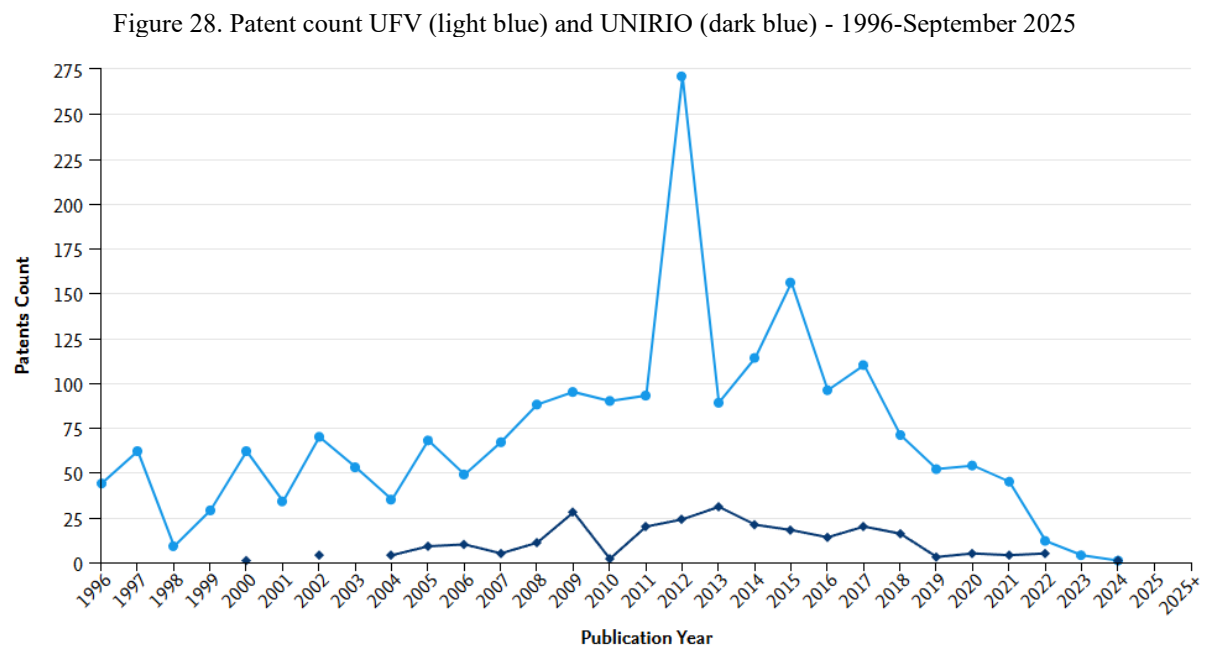
Experience dimension and its subdimension "scientific and technological research"; and the Impact dimension and its subdimension "economic impact".

Figure 27 shows the academic output of UFV and UNIRIO, considering all subject areas and all types of publications.



Source: SciVal (2025).

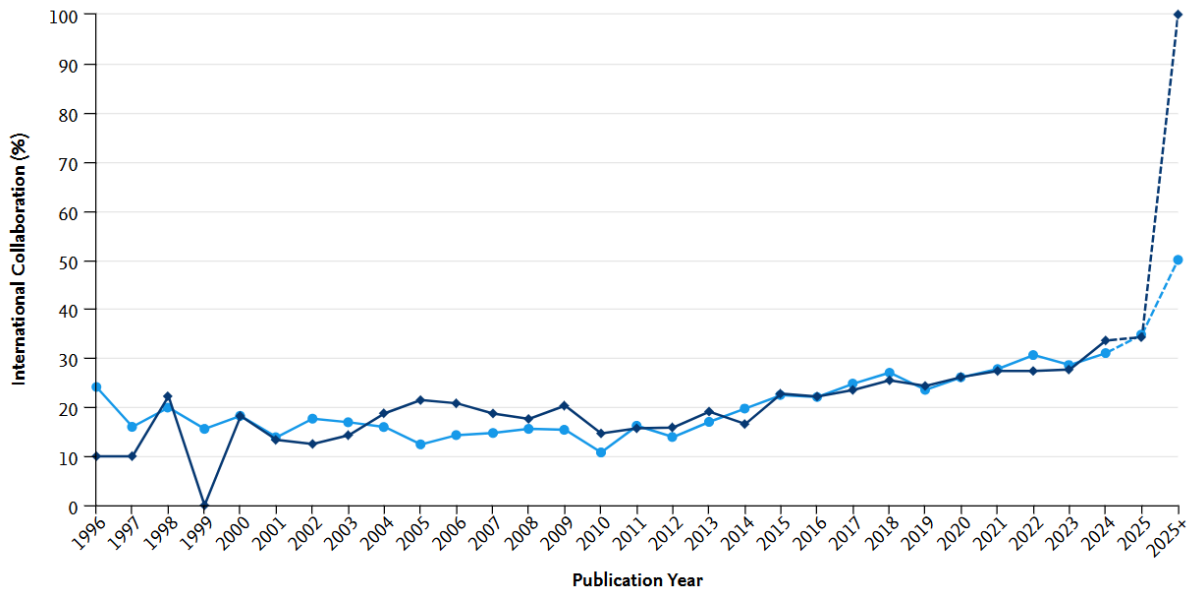
Figure 28 shows the number of patents from both universities, considering all subject areas and all types of publications and patent offices.



Source: SciVal (2025).

Figure 29 shows the percentage of international collaboration among HEIs, considering all subject areas and all types of publications.

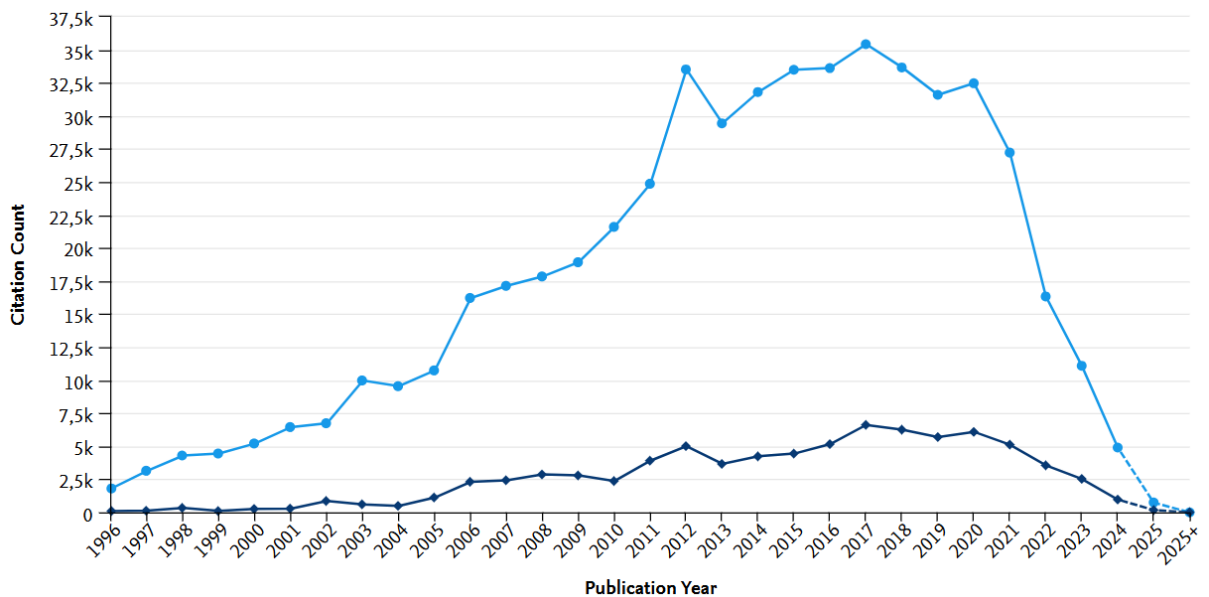
Figure 29. Percentage of international collaboration UFV (light blue) and UNIRIO (dark blue) - 1996-September 2025



Source: SciVal (2025).

Figure 30 shows the citation counts for universities, considering all subject areas and all types of publications.

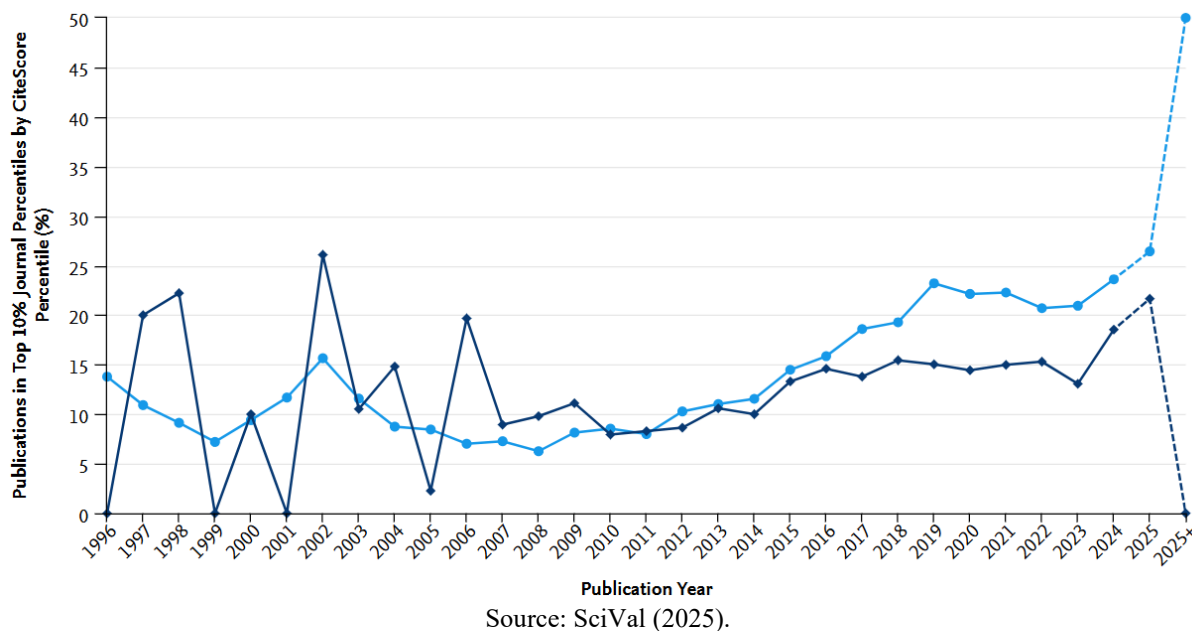
Figure 30. Citation counts for UFV (light blue) and UNIRIO (dark blue) - 1996-September 2025



Source: SciVal (2025).

Figure 31 shows publications from UFV and UNIRIO in the top 10% of journals, according to CiteScore.

Figure 31. Publications in the top 10% of journals according to CiteScore - UFV (light blue) and UNIRIO (dark blue) - 1996-September 2025



It should be noted that, except for the metrics “percentage of international collaboration” and “publications in the top 10% of journals”, UFV’s performance has been significantly better since the beginning of the historical series in 1996.

It should be emphasized that the PMS model classified the objects of analysis as polar (extreme) cases. Exploring the dimensions, subdimensions and indicators of the model, based on the cross-referencing of information collected from UFV and UNIRIO and presented, respectively, in sections [5.1](#) and [5.2](#), it can be seen that, in the Governance and Ecosystem dimension, the more consolidated the organizational structure to coordinate the entrepreneurial agenda at the university and with other parts of the ecosystem, the greater the capillarity achieved.

The Tangible Enablers dimension showed notable differences between the objects of analysis. It should be noted that the existence of a partnership between the science and technology park and the university contributes to the finances (budget) of the HEI and to the technological and physical infrastructure. The analysis of the cases also showed that there is potential to be examined by universities in relation to the provision of entrepreneurial training for technicians and faculty, a formal career development policy for all employees that addresses

entrepreneurship and includes this agenda in performance evaluations, and recognition for those staff members engaged in innovative initiatives.

The Entrepreneurial Training and Experience dimension showed how impactful scientific production, entrepreneurship and innovation programs, and extension projects significantly affect the entrepreneurial performance of a HEI.

In the Impact dimension, it was evident how the university's technology transfer capacity interferes with the results of economic impact indicators, as well as how the existence of an institutional center dedicated to social entrepreneurship actions can enhance the deliveries and results perceived by the local community.

5.4 DISCUSSION

When analyzing the evidence from the cases studied, it appears that institutional maturity in the entrepreneurial agenda influenced compliance with the indicators of the dimensions and subdimensions of the PMS model. This is supported by the literature, which showed that the entrepreneurial archetype of the university is influenced by factors such as institutional heritage, economic and political environment, organizational culture and leadership.

UFV outperformed UNIRIO in all thirteen subdimensions of the model, which is consistent with its position in the 2023 Entrepreneurial HEIs ranking. The theoretical implication is that the use of the PMS allows federal public universities to self-assess to improve their ranking position. This study could be replicated to investigate how the model behaves for private and community HEIs.

The application of the PMS at UFV and UNIRIO suggests that its use can induce more significant changes in entrepreneurial performance and, consequently, generate greater contributions in newer and less institutionally mature HEIs in the entrepreneurial agenda. The model would be especially useful for universities that do not yet have teaching, research, extension and management processes aligned with the entrepreneurial strategy, or that do not yet have human resources being continuously developed and trained in entrepreneurship, nor an established technology and innovation infrastructure that exposes students to more realistic environments capable of awakening or fostering their entrepreneurial intent.

However, according to one of the three experts consulted, the PMS could also be used as a data repository to reduce the time spent by managers responding to various rankings, as it synthesizes and consolidates relevant management indicators. This allows for improved governance and organizational learning in HEIs.

By determining performance indicators for each subdimension identified in scientific literature as critical for teaching and promoting entrepreneurship in higher education, the model presents a path through which HEIs can monitor and improve their entrepreneurial performance, enhancing their decision-making processes and practices, reducing guesswork and risks, and improving their positions in university entrepreneurship rankings.

6 CONCLUSIONS

Chapter 1 of this thesis introduced the research problem, the scientific justification for the topic and the objectives of the work: to identify which dimensions, subdimensions and indicators are necessary in an PMS for entrepreneurial HEIs and to structure a model for self-assessment of these institutions.

Chapter 2 presented the research methods in two sections. To structure the conceptual modeling of the PMS, exploratory theoretical research into performance measurement systems was undertaken, as well as a Systematic Literature Review was conducted for in-depth theoretical research of academic entrepreneurship and evaluation of the entrepreneurial performance of HEIs. Furthermore, the PMS was submitted for analysis by three experts in entrepreneurship and innovation, whose recommendations were analyzed for incorporation into the model. Moreover, the chapter described the six stages of the case study, which was carried out to validate the PMS by applying it to the highest-ranked federal public university in the most recent edition of Entrepreneurial HEIs, held in 2023, and the lowest-ranked federal public university, to compare extremes. This involved selecting UFV and UNIRIO as cases, respectively.

Chapter 3 was dedicated to the theoretical reference underlying the thesis, by presenting the results of the exploratory theoretical research undertaken and of the Systematic Literature Review. It consisted of identifying and comparing six PMSs, as well as seven university

entrepreneurship rankings and five tools for assessing the entrepreneurial performance of HEIs. Besides, critical success factors for teaching and promoting entrepreneurship in higher education were discussed.

Based on findings from scientific literature and on the validation by three experts in entrepreneurship and innovation, Chapter 4 structured a PMS model for entrepreneurial universities with dimensions, subdimensions and indicators. The chapter also provided guidelines for use and potential gains from its application in HEIs. It should be noted that the model's indicators (listed in Appendix B) sought to ensure that issues of density and temporality were considered, to allow ecosystems of different sizes to be compared using a "fair yardstick", as considered by one of the experts consulted. Furthermore, another concern was to ensure that the indicators were useful for decision-makers and that their collection was facilitated, with the aim of enabling their monitoring to improve governance and organizational learning in universities.

Chapter 5 discussed the case study, which compared how the model behaved for the two HEIs selected for convenience. To this end, evidence from UFV and UNIRIO was investigated for the indicators of each dimension and subdimension of the PMS model. In addition to the scores in Entrepreneurial HEIs 2023, the scores of the two universities for each dimension of the RUE 2021 indicators were also considered, as these were the ones to which the author had access, since Brasil Júnior – responsible for the ranking – did not make the scores for the 2023 edition available. Additionally, data collection was carried out based on a documentary analysis of the UFV and UNIRIO Management Reports for 2024 (the most recent at the time of the study's completion) and the current Institutional Development Plans of the two universities, as well as consultation of the institutional websites of the selected HEIs and of the SciVal platform for comparison between the objects of analysis.

Chapter 6 summarizes the work for the conclusions. Through the evaluation of the three experts consulted, it was found that the model is comprehensive, representative and useful for defining parameters that enable HEIs to self-assess, aiming to improve both teaching and the promotion of entrepreneurship and innovation. The application of the PMS to the two objects of analysis, UFV and UNIRIO, suggested that its use can generate greater contributions in guiding the decision-making processes and practices of newer and less institutionally mature universities in the entrepreneurial agenda. These institutions could, through the model, induce significant

changes in their entrepreneurial performance, which would also allow them to improve their positions in national and international university entrepreneurship rankings. However, one of the experts consulted stated that the PMS could also function as a data repository, as it synthesizes and consolidates relevant management indicators, thus reducing the time spent by managers responding to various rankings. Therefore, the research question has been answered, and the objectives have been met.

6.1 SUGGESTIONS FOR FUTURE WORK

One limitation of this study concerns the practical application of the PMS, which was carried out exclusively in Brazilian federal public universities. Therefore, it is suggested for future work that the model be applied in private and community HEIs in order to identify which audience would respond best to the model – as pointed out by one of the experts consulted – and to evaluate the potential gains from using the PMS, presented in section [4.2](#). Moreover, the application of the model in HEIs from other countries is also suggested.

In addition, a correlation analysis is suggested to support the assignment of weights for each dimension and subdimension of the model, also as considered by one of the experts.

6.2 SCIENTIFIC DISSEMINATION OF THE RESEARCH

The article "Rankings and entrepreneurial higher education" was published in May 2025 in the Swiss journal *Frontiers in Education*, in its Higher Education section:

- CELESTE LFC, DA SILVA CES and MELLO CHP (2025) Rankings and entrepreneurial higher education. *Front. Educ.* 10:1562664. doi: 10.3389/educ.2025.1562664.

During the doctoral period, the article "Ranking of Entrepreneurial Universities and the Performance of Federal Universities" was published in October 2022 in the Proceedings of the National Meeting on Production Engineering:

- SILVA, C. E. S.; PETRUCCI, E. R. O.; COSTA, L. F.; SOUZA, W. V. B.; SALGADO, E. G. Ranking of Entrepreneurial Universities and the Performance of Federal

Universities. In: XLII National Meeting on Production Engineering, 2022, Foz do Iguçu/PR. XLII ENEGEP. doi: 10.14488/enegep2022_ti_pes_398_1954_45269.

REFERENCES

- ABEPRO – Associação Brasileira de Engenharia de Produção. **Áreas e Sub-áreas de Engenharia de Produção**. Available at: <https://abepro.org.br/interna.asp%3Fc%3D362>. Accessed on: Mar. 17, 2025.
- ACEEU – Accreditation Council for Entrepreneurial and Engaged Universities. Available at: <https://www.aceeu.org/>. Accessed on: Jan. 22, 2025.
- AKINYOADE, A., DIETZ, T., and UCHE, C. Introduction. In Akinyoade, A., Dietz, T., & Uche (Eds.) **Entrepreneurship in Africa**. Boston: Brill, 2017. <https://doi.org/10.1163/9789004351615>.
- AL AMIMI, M. H.; AHMAD, S. Z. The moderating effect of educational support on the relationship between self-efficacy and intention in cyber entrepreneurship. **Journal Of Work-Applied Management**, v. 15, n. 2, p. 216–232, 2023.
- ALBANO, F. **Desenvolvimento de um modelo de avaliação global de desempenho**. Dissertation (Master's). School of Engineering. Porto Alegre: Federal University of Rio Grande do Sul, 2008. 122 p.
- ALVES, A. B. V.; VANZ, S. A. de S.; CALDERÓN, A.; WANDERCIL, M. International university rankings in the management tools of ranked Brazilian universities. **Journal of Applied Studies in Education**, v. 8, 2023.
- AMBRUS, S. **Educators debate negative effects of international rankings on Latin American universities**. Chronicle of Higher Education. Published on: May 20, 2012. Available at: http://www.encuentro-rankings.unam.mx/Documentos/nota6_che.pdf. Accessed on: Jan. 17, 2025.
- AMERICAN CALDWELL. **Global University Visibility Rankings**. Available at: <https://americancaldwell.com/guv-rankings>. Accessed on Jan. 22, 2025.
- ARRANZ, N., ARROYABE, M. F., FDEZ. DE ARROYABE, J. C. Entrepreneurial intention and obstacles of undergraduate students: the case of the universities of Andalusia. **Studies in Higher Education**, 44(11), 2011-2024, 2019. <https://doi.org/10.1080/03075079.2018.1486812>.
- ATTADIA, L. C. do L.; MARTINS, R. A. Medição de desempenho como base para evolução da melhoria contínua. **Revista Produção**, v. 13, n. 2, 2003, pp. 33-41.
- BADAT, S. **Global rankings of universities: A perverse and present burden**. In E. Unterhalter & V. Carpentier (Eds.), *Global inequalities and higher education: Whose interests are we serving?* (p. 117–41). [S. l.]: Palgrave Macmillan, 2010. Available at: https://www.ru.ac.za/media/rhodesuniversity/content/vc/documents/Global_rankings_of_universities_a_perverse_and_present_burden.pdf. Accessed on: Jan. 17, 2025.
- BALANCED SCORECARD INSTITUTE. **Balanced Scorecard Basics**. Available at: <https://balancedscorecard.org/bsc-basics-overview/>. Accessed on: Mar. 22, 2025.

BALIYAN, S. P.; MOSIA, P. A.; BALIYAN, P. S. Gender differences in entrepreneurial attitudes and constraints: Do the constraints predict university agriculture graduates' attitudes towards entrepreneurship? **International Journal of Higher Education**, v. 9, n. 5, p. 259–273, 2020.

BAZHENKOV, I. *et al.* Rating of Higher Education Institutions - the Basis of Competitiveness. **Review of Economics and Finance**, v. 21, n. 1, p. 278–285, 2023.

BECKMAN, G. D., CHERWITZ, R.A. Intellectual entrepreneurship: an authentic foundation for higher education reform. **Planning for Higher Education**, v. 37, n. 4, p. 27, 2009. Available at: <http://ut-ie.com/articles/ed-reform.pdf>. Accessed on: Jan. 17, 2025.

BHATTACHERJEE, A. **Unit of Analysis: Concepts, Constructs, and Variables**. Libre Texts Social Sciences, 2021. Available at: [https://socialsci.libretexts.org/Bookshelves/Social_Work_and_Human_Services/Social_Science_Research_-_Principles_Methods_and_Practices_\(Bhattacharjee\)/02%3A_Thinking_Like_a_Researcher/2.02%3A_Concepts_Constructs_and_Variables](https://socialsci.libretexts.org/Bookshelves/Social_Work_and_Human_Services/Social_Science_Research_-_Principles_Methods_and_Practices_(Bhattacharjee)/02%3A_Thinking_Like_a_Researcher/2.02%3A_Concepts_Constructs_and_Variables). Accessed on: Sept. 11, 2025.

BITITCI, U. S.; CARRIE, A. S.; MCDEVITT, L. G. Integrated Performance Measurement Systems: A Development Guide. **International Journal of Operations and Production Management**, v. 17, n. 6, 1997, pp. 522-535.

BNDES – Brazilian Development Bank. **Como os objetivos do desenvolvimento sustentável podem ajudar os negócios das empresas?** Published on: Nov. 22, 2019. Available at: <https://agenciadenoticias.bndes.gov.br/blogdodesenvolvimento/detalhe/Como-os-objetivos-do-desenvolvimento-sustentavel-podem-ajudar-os-negocios-das-empresas/#:~:text=The%20SDGs%20were%20agreed%20upon%20by,business%20strategies%20with%20global%20priorities>. Accessed on: Jan. 9, 2025.

BOND, E. **Performance measurement for a scenario of companies in a supply chain**. Dissertation (Master's). São Carlos School of Engineering. São Carlos: University of São Paulo, 2002. 125 p.

BRASIL JÚNIOR. **Como o empreendedorismo acontece dentro das universidades**. Published on: Sept. 24, 2020. Available at: <https://brasiljunior.org.br/blog/como-o-empreendedorismo-acontece-dentro-das-universidades>. Accessed on: Jan. 27, 2025.

BRASIL JÚNIOR. **IES Empreendedoras 2025: uma oportunidade de transformação no ensino superior**. Published on: Dec. 7, 2024. Available at: <https://brasiljunior.org.br/blog/ies-empreendedoras-2025-uma-oportunidade-de-transformacao-no-ensino-superior>. Accessed on Sept. 5, 2025.

BRAZIL. **Decree No. 9283, of February 7, 2018**. Regulates Law No. 10,973, of December 2, 2004, Law No. 13,243, of January 11, 2016, Article 24, § 3, and Article 32, § 7, of Law No. 8,666, of June 21, 1993, Article 1 of Law No. 8,010, of March 29, 1990, and Article 2, caput, item I, subitem "g," of Law No. 8,032, of April 12, 1990, and amends Decree No. 6,759, of February 5, 2009, to establish measures to encourage innovation and scientific and technological research in the productive environment, with a view to technological training, the achievement of technological autonomy, and the development of the national and regional

productive system. Official Gazette. Brasília, Feb. 8 (2018). Available at: https://www.planalto.gov.br/ccivil_03/_ato2015-2018/2018/decreto/d9283.htm. Accessed on: Aug. 5, 2025.

BRAZIL. **Complementary Law No. 182, of June 1, 2021**. Establishes the legal framework for startups and innovative entrepreneurship; and amends Law No. 6,404, of December 15, 1976, and Complementary Law No. 123, of December 14, 2006. Official Gazette. Brasília, June 2 (2021). Available at: https://www.planalto.gov.br/ccivil_03/leis/lcp/lcp182.htm. Accessed on: Aug. 5, 2025.

BRAZIL. **Law No. 13267, of April 6, 2016**. Regulates the creation and organization of associations called junior enterprises, operating within higher education institutions. Official Gazette. Brasília, April 7, 2016. Available at: https://www.planalto.gov.br/ccivil_03/_ato2015-2018/2016/lei/113267.htm. Accessed on: Aug. 5, 2025.

BRAZIL. Ministry of Planning, Budget, and Management. Federal Budget Secretariat. Secretariat of Planning and Strategic Investments. **Indicadores: Orientações Básicas Aplicadas à Gestão Pública**. Coordenação de Documentação e Informação. Brasília: MP, 2012. 64p.

BRAZIL. Court of Justice of the Federal District and Territories/TJDFT. **Guia de Indicadores de Desempenho TJDFT**. Brasília: TJDFT/SEPG, 2018, 42p.

BRONSTEIN, J.; REIHLEN, M. Entrepreneurial university archetypes: a meta-synthesis of case study literature. **Ind. High. Educ.** 28 (4), 245–262, 2014.

CALDEIRA, J. P. **O fim do Ciência sem Fronteiras depois de R\$13 bilhões investidos em bolsas no exterior**. Jornal GGN. Published on: June 30, 2017. Available at: <https://jornalggn.com.br/noticia/o-fim-do-ciencia-sem-fronteiras-depois-de-r-13-bilhoes-investidos-em-bolsas-no-exterior>. Accessed on: Jan. 18, 2025.

CALDERÓN, A. I.; WANDERCIL, M.; FONSECA, D.M.R.; VANZ, S.A. de S (org.). **A construção de universidades de classe mundial e rankings acadêmicos no espaço do Ensino Superior de língua portuguesa e em outras realidades do mundo**. Brasília: National Association of Education Policy and Administration (ANPAE), 2023.

CALDERÓN, A. I., FRANÇA, C. M. **Os rankings acadêmicos da educação superior: Apontamentos no campo da avaliação educacional**. In J. C. Rothen, & A. C. M. Santana (Eds.), *Assessment of education: References for an initial discussion* (pp. 95-114). [São Carlos]: UFSCar Press, 2018.

CALDERÓN, A. I.; WANDERCIL, M., MARTINS, E. C. **Rankings acadêmicos e governança universitária no espaço do ensino superior de língua portuguesa: Angola, Cape Verde, Macau, Mozambique, Portugal, and Brazil**. Brasília: National Association of Education Policy and Administration (ANPAE), 2019.

CÂNDIDO, L. F.; LIMA, S. H. de O.; BARROS NETO, J. de P. Análise de sistemas de medição de desempenho na indústria da construção. **Ambiente Construído**, v. 16, n. 2, pp. 189-208, 2016.

CÂNDIDO, L. F.; LIMA, S. H. de O.; BARROS NETO, J. de P. Medição e gestão de desempenho em empresas construtoras. **Ambiente Construído**, v. 20, n. 1, pp. 195-214, 2020.

CANTWELL, B. **The geopolitics of the education market**. In E. Hazelkorn (Ed.), *Global rankings and the geopolitics of higher education* (Chapter 18). [S. l.]: Routledge, 2016. <https://doi.org/10.4324/9781315738550>.

CAUCHICK MIGUEL, P. A. Estudo de caso na engenharia de produção: estruturação e recomendações para sua condução. **Produção**, v. 17, n. 1, pp. 216-229, 2007.

CAUCHICK MIGUEL, P. A. (ed.). **Metodologia de Pesquisa em Engenharia de Produção e Gestão de Operações**. 2nd ed. [S.l.]: Elsevier, 2011.

CGU – Office of the Comptroller General. **CGU avalia papel das universidades federais no ecossistema nacional de inovação**. Published on: Dec. 20, 2023. Available at: <https://www.gov.br/cgu/pt-br/assuntos/noticias/2023/12/cgu-avalia-papel-das-universidades-federais-no-ecossistema-nacional-de-inovacao>. Accessed on: July 12, 2025.

CHAI, C. **Universidades empreendedoras e ambientes de inovação**: Uma proposta de sustentabilidade econômica para o ensino superior. Thesis (Doctorate). Graduate Program in Administration. Caxias do Sul: University of Caxias do Sul, 2019. 283 p.

CHALLENGE SUCCESS. **A “fit” over rankings**: Why college engagement matters more than selectivity. Stanford Graduate School of Education. Published in: Oct. 2018. Available at: https://ed.stanford.edu/sites/default/files/challenge_success_white_paper_on_college_admissions_10.1.2018-reduced.pdf. Accessed on: Jan. 15, 2024.

CHATTERJEE, S.; HADI, A. S. Frontmatter. In **Regression Analysis by Example** (eds S. Chatterjee and A.S. Hadi), 2006. <https://doi.org/10.1002/0470055464.fmatter>

CHEN, X.; ZHU, J. Quality Evaluation of Innovation and Entrepreneurship Education in Colleges and Universities Based on CIPP Model and AHP. **Artificial Intelligence, Medical Engineering and Education**, pp. 768-778, 2024.

CHIEF OF STAFF NETWORK. **A Brief History of OKRs and KPIs**. Published on: June 5, 2023. Available at: <https://www.chiefstaff.network/blog/a-brief-history-of-okrs-and-kpis#:~:text=The%20concept%20of%20KPIs%20dates,and%20efficiency%20in%20industrial%20settings>. Accessed on: Apr. 14, 2025.

CHOI, K.; PARK, J.; CHO, D.; CHU, H.Y. The impact of university support on the creation of student entrepreneurs: evidence from South Korea, **Entrepreneurship Research Journal**, v. 8, n. 1, 2017, doi: 10.1515/erj-2017-0010.

CLARK, B. The entrepreneurial university: Demand and response. **Tertiary Education and Management**, 4(1), 5–16, 1998. <https://doi.org/10.1007/bf02679392>

COMBESSIE, J. C. **The method in Sociology**. São Paulo: Loyola Editions, 2004.

CORRÊA, J. de S. **Dimensões, características e indicadores para avaliação das Universidades Empreendedoras brasileiras**. Dissertation (Master's). Graduate Program in Engineering and Knowledge Management. Florianópolis: Federal University of Santa Catarina, 2022. 171 p.

CROSS, K. F.; LYNCH, R. L. Managing the corporate warriors. **Quality Progress**, v. 23, n. 4, p. 54-59, 1990.

DAHLBORG, C.; LEWENSOHN, D.; DANELL, R.; SUNDBERG, C. J. To invent and let others innovate: A framework of academic patent transfer modes. **Journal of Technology Transfer**, v. 42, p. 538–63, 2016.

DARWIN, S.; BARAHONA, M. Globalizing or assimilating? Exploring the contemporary function of regionalized global university rankings in Latin America. **Higher Education**, 2023.

DAVEY, T., ROSSANO, S., van DER SIJDE, P. Does context matter in academic entrepreneurship? The role of barriers and drivers in the regional and national context, **The Journal of Technology Transfer**, v. 41, n. 6, pp. 1457-1482, 2016, doi: 10.1007/s10961-015-9450-7.

DECUYPERE, M.; LANDRI, P. Governing by visual shapes: university rankings, digital education platforms and cosmologies of higher education. **Critical Studies in Education**, v. 62, n. 1, p. 17-33, 2021.

DICK-SAGOE, C. *et al.* Facilitators of tertiary students' entrepreneurial intentions: Insights for Lesotho's national entrepreneurship policy. **Heliyon**, v. 9, n. 6, June 1, 2023. doi: 10.1016/j.techfore.2019.119735.

DOLCIMASCULO, A. **Análise dos indicadores e critérios dos rankings globais de universidades pela ótica do conceito de universidade empreendedora**. Dissertation (Master's). Graduate Program in Administration. Curitiba: Federal Technological University of Paraná, 2020. 123 p.

DOS SANTOS, P. **Educação empreendedora universitária: uma proposta de modelo**. Thesis (Doctorate). Graduate Program in Science Education: Chemistry of Life and Health. Porto Alegre: Federal University of Rio Grande do Sul, 2024. 131 p.

DOURADO, Bruna. **O que são KPIs e tudo o que você precisa saber sobre os Indicadores de Negócio**. Published on: Aug. 23, 2024. Available at: <https://www.rdstation.com/blog/marketing/kpis/>. Accessed on: Apr. 4, 2025.

DVORETSKAYA, V. V *et al.* Scenarios of the innovative development of education in the context of the Russian economy's modernization: entrepreneurial universities vs. high-tech universities. **Frontiers In Education**, v. 8, 2023.

EDVINSSON, L.; MALONE, M. S. **Intellectual Capital: Discovering the Real Value of Your Company by Identifying Its Internal Values**. São Paulo: Makron Books, 1998.

EGIDA/USP – Office for the Management of Academic Performance Indicators at the University of São Paulo. Available at: <https://egida.usp.br/rankings/>. Accessed on: Sept. 13, 2024.

ELEVLI, S.; ELEVLI, B. A study of entrepreneur and innovative university index by entropy-based grey relational analysis and PROMETHEE. **Scientometrics**, v. 129, n. 6, p. 3193–3223, 2024.

ENTREPRENEURIAL UNIVERSITIES. **Methodology**. Available at: <https://www.entrepreneurial-universities.org/index/methodology>. Accessed on: Jan. 17, 2025.

ESTADÃO. **Guia da Faculdade**: Sobre a avaliação. Available at: <https://publicacoes.estadao.com.br/guia-da-faculdade/sobre/>. Accessed on: Sept. 29, 2024.

ETZKOWITZ, H. Innovation in innovation: The Triple Helix of university-industry-government relations. *Social Sciences Information*. **Information Sur Les Sciences Sociales**, 42(3), 293–337, 2003. <https://doi.org/10.1177/05390184030423002>

ETZKOWITZ, H.; GERMAIN-ALAMARTINE, E.; KEEL, J.; KUMAR, C.; Smith, K. N.; Albats, E. Entrepreneurial university dynamics: Structured ambivalence, relative deprivation and institution-formation in the Stanford innovation system. **Technological Forecasting & Social Change**, 2018. doi.org/10.1016/j.techfore.2018.10.019

FANELLI, A. G. De; CARRANZA, M. P. Los rankings y sus usos en la gobernanza universitaria. **Revista CTS**, no. 37, vol. 13 (pp. 95-112), 2018.

FARRELL, A. A. *et al.* Consensus study on factors influencing the academic entrepreneur in a middle-income country's university enterprise. **Journal Of Entrepreneurship In Emerging Economies**, v. 16, n. 5, p. 1409–1430, 2024.

FERNÁNDEZ, L.; FERNÁNDEZ-LÓPEZ, S.; REY-ARES, L.; BOBILLO, M. Innovation in the First Mission of Universities. **Journal of Innovation Management**, v. 6, n. 4, p. 32-48, 2018.

FISCHER, B. B., MORAES, G. H. S. M. D.; SCHAEFFER, P. R. Universities' institutional settings and academic entrepreneurship: notes from a developing country, **Technological Forecasting and Social Change**, v. 147, pp. 243-252, 2019, doi: 10.1016/j.techfore.2019.07.009.

FITZGERALD, L., JOHNSON, R., BRIGNALL, S., SILVESTRO, R., VOSS, C. **Performance Measurement in Service Businesses**, London: CIMA, 1991.

FNQ – National Quality Foundation. **Indicadores de Desempenho**: Estruturação do Sistema de Indicadores Organizacionais. 3rd ed. São Paulo: National Quality Foundation, 2012.

FORBES. **Bilionários 2025**: Alta do Dólar Reduz Brasileiros da Lista da Forbes de 69 para 56.. Published on: April 1, 2025. Available at: <https://forbes.com.br/forbes-money/2025/04/bilionarios-2025-alta-do-dolar-reduz-brasileiros-da-lista-da-forbes-de-69-para-55/>. Accessed on: July 29, 2025.

FORBES. **How We Rank America's Best Colleges**. Published: Aug. 27, 2024. Available at: <https://www.forbes.com/sites/emmawhitford/2024/08/27/how-we-rank-americas-best-colleges/>. Accessed: Jan. 27, 2025.

FORBES. **Startup Schools: America's Most Entrepreneurial Universities 2014**. Published: July 28, 2015. Available at: <https://www.forbes.com/sites/liyanchen/2014/07/30/startup-schools-americas-most-entrepreneurial-universities/>. Accessed on: Jan. 27, 2025.

FULLER, D.; BEYNON, M.; PICKERNELL, D. Indexing third stream activities in UK universities: exploring the entrepreneurial/enterprising university. **Studies In Higher Education**, v. 44, n. 1, p. 86–110, 2019.

FULLER, D.; PICKERNELL, D. Identifying groups of entrepreneurial activities at universities. **International Journal Of Entrepreneurial Behavior & Research**, v. 24, n. 1, p. 171–190, 2018.

GALTUNG, J. **Teoría y métodos de la investigación social**. Buenos Aires: Editorial Universitaria de Buenos Aires, 1965.

GANGA-CONTRERAS, F.; SÁEZ SAN MARTIN, W.; VIANCOS GONZÁLEZ, P.; ABELLO ROMERO, J. Rankings universitarios, ni ángeles ni demonios: críticas y usos por parte de grupos de interés. **Journal of the Academy**, no. 9, pp. 158-183, 2023.

GARBUTT, J., ANTES, A., MOZERSKY, J., PEARSON, J., GRAILER, J., TOKER, E., DUBOIS, J. Validating curricular competencies in innovation and entrepreneurship for biomedical research trainees: a modified Delphi approach, **Journal of Clinical and Translational Science**, v. 3, no. 4, pp. 165-183, 2019, doi: 10.1017/cts.2019.390.

GEM – Global Entrepreneurship Monitor. **Global Entrepreneurship Monitor 2024/2025 Global Report: Entrepreneurship Reality Check**. London: GEM, 2025. Available at: <https://www.gemconsortium.org/reports/latest-global-report>. Accessed on: Aug. 5, 2025.

GEM Brazil – Global Entrepreneurship Monitor Brazil. **Entrepreneurship in Brazil in 2024: Executive Report**. Published on: April 4, 2025. Available at: <https://datasebrae.com.br/pesquisa-gem/>. Accessed on: Aug. 5, 2025.

GODOY, T. P.; WEGNER, R. da S.; GODOY, L. P.; BUENO, W. P.; NETO, C. R. P. Comparação de modelos dos sistemas de medição de desempenho com base nos indicadores de qualidade. **Revista Iberoamericana de Engenharia Industrial**. Florianópolis, v. 8, n. 15, p. 29-49, 2016.

GREENMETRIC. Available at: <https://greenmetric.ui.ac.id/>. Accessed on: Sept. 29, 2024.

GROVE, J. **Social sciences and humanities faculties 'to close' in Japan after ministerial intervention**. Published on: Sept. 14, 2015. Available at: <https://www.timeshighereducation.com/news/social-sciences-and-humanities-faculties-close-japan-afer-ministerial-intervention>. Accessed on: Jan. 17, 2025.

GUL, M. Digital business strategies and competitive superiority, **International Journal of Business Ecosystem and Strategy** (2687-2293), v. 2, n. 1, pp. 15-29, 2020, doi: 10.36096/ijbes.v2i1.106.

GUO, F., Restubog, S. L. D., Cui, L., Zou, B., Choi, Y. What determines the entrepreneurial success of academics? Navigating multiple social identities in the hybrid career of academic entrepreneurs, **Journal of Vocational Behavior**, v. 112, pp. 241-254, 2019, doi: 10.1016/j.jvb.2019.03.003.

HAKALA, J., Ylijoki, O.-H. Research for whom? Research orientations in three academic cultures. **Organization**, 8(2), 373–380, 2001.

HAZELKORN, E. Rankings and the battle for world-class excellence. **Higher Education Management and Policy**, v. 21, n. 1, p. 1-22, 2008.

HAZELKORN, E. **Impact of Global Rankings on Higher Education Research and the Production of Knowledge**. [Paris]: UNESCO Forum on Higher Education, Research and Knowledge, 2009.

HAZELKORN, E. **The obsession with rankings in tertiary education: Implications for public policy**. Washington-DC: World Bank, 2015.

HAZELKORN, E. **World-Class Universities or World-Class Systems? Rankings and Higher Education Policy Choices**, in E. Hazelkorn, P. Wells & M. Marope (eds) *Rankings and Accountability in Higher Education: Uses and Misuses*. Paris: UNESCO, 2013.

HAZELKORN, E.; LOUKKOLA, T.; ZHANG, T. **Rankings in institutional strategies and processes: impact or illusion?** European University Association, 2014.

HEINNOVATE. **Self-assessment**. Available at: <https://www.heinnovate.eu/en/self-assessment/bHRkZ003SmVEb25XVVg3eGgzRU5Bdz09?step=0>. Accessed on: Jan. 24, 2025.

HOFER, A.; POTTER, J. Universities, Innovation and Entrepreneurship: Criteria and Examples of Good Practice. **OECD Local Economic and Employment Development (LEED) Papers**, 2010.

HRONEC, S. M. **Vital signs: using measures of quality, time, and cost performance to chart the course for your company's future**. São Paulo: Makron Books, 1994.

HUANG, T. C., WANG, Y. J., LAI, H. M. What drives internet entrepreneurial intention to use technology products? An investigation of technology product imagination disposition, social support, and motivation, **Frontiers in Psychology**, v. 13, 2022, doi: 10.3389/fpsyg.2022.829256.

IES Empreendedoras. Available at: <https://iesempreendedoras.brasiljunior.org.br/>. Accessed on: Aug. 5, 2025.

IGI Global. **What is Entrepreneurial and Innovative University Index (EIUI)**. Available at: <https://www.igi-global.com/dictionary/entrepreneurial-and-innovative-university-index-eiui/71967>. Accessed on: Jan. 22, 2025.

INEP – Anísio Teixeira National Institute for Educational Studies and Research. **Conceito Preliminar de Curso (CPC)**. Published on: Sept. 16, 2020(a). Available at: <https://www.gov.br/inep/pt-br/areas-de-atuacao/pesquisas-estatisticas-e-indicadores/indicadores-de-qualidade-da-educacao-superior/conceito-preliminar-de-curso-cp><https://www.gov.br/inep/pt-br/areas-of-activity/statistical-research-and-indicators/higher-education-quality-indicators/general-course-index-igc>. Accessed on: Sept. 25, 2024.

INEP – Anísio Teixeira National Institute for Educational Studies and Research. **Índice Geral de Cursos (IGC)**. Published on: Sept. 16, 2020(b). Available at: <https://www.gov.br/inep/pt-br/areas-de-atuacao/pesquisas-estatisticas-e-indicadores/indicadores-de-qualidade-da-educacao-superior/indice-geral-de-cursos-igc>. Accessed on: Sept. 25, 2024.

INEP – Anísio Teixeira National Institute for Educational Studies and Research. **Divulgados os resultados do IDD, CPC e IGC**. Published on: April 2, 2024. Available at: <https://www.gov.br/inep/pt-br/assuntos/noticias/indicadores-de-qualidade-da-educacao-superior/divulgados-os-resultados-do-idd-cpc-e-igc>. Accessed on: Sept. 25, 2024.

ISHIZAKA, A. *et al.* Examining knowledge transfer activities in UK universities: advocating a PROMETHEE-based approach. **International Journal Of Entrepreneurial Behavior & Research**, v. 26, n. 6, p. 1389–1409, 2020.

KALAR, B., ANTONCIC, B. The entrepreneurial university, academic activities and technology and knowledge transfer in four European countries, **Technovation**, v. 36/37, pp. 1-11, 2015, doi: 10.1016/j.technovation.2014.11.002.

KARLSDOTTIR, V. *et al.* Assessing Academics' Third Mission Engagement by Individual and Organisational Predictors. **Administrative Sciences**, v. 13, n. 1, 2023.

KAYDOS, W. **Measuring, managing and maximizing performance**. Portland: Productivity Press, 1991.

KEEGAN, D. P. *et al.* Are your performance measures obsolete? **Management Accounting**. Jun., pp. 45-50, 1989.

KIZILASLAN, R.; UYSAL, O.; TURKYILMAZ, A. Assessing the impact of academic assets on innovation and entrepreneurship: an application of DEA to Turkish universities. **Asia Pacific Journal of Innovation and Entrepreneurship**, 2025.

KOCHETKOV, D. M.; LARIONOVA, V. A.; VUKOVIC, D. B. Entrepreneurial capacity of universities and its impact on regional economic growth. **Economy of Regions**, v. 13, n. 2, p. 477–488, 2017.

KONAK, A. *et al.* Enhancing student learning in innovation competitions and programs. **European Journal Of Engineering Education**, 2024.

- KRABEL, S. Are entrepreneurs made on campus? The impact of entrepreneurial universities and graduates' human capital on graduates' occupational choice. **Journal of International Entrepreneurship**, v. 16, n. 4, p. 456–485, Dec. 1, 2018.
- KRUEGER, N. Entrepreneurial Intentions are dead: long live Entrepreneurial Intentions. In **Understanding the entrepreneurial mind**. A.L. Carsrud, M. Brännback (eds.), International Studies in Entrepreneurship 24, 2009.
- KURATKO, D. F., MORRIS, M. H. Examining the future trajectory of entrepreneurship. **Journal of Small Business Management**, 56(1): 11-23, 2019.
- LEBAS, M. J. Performance measurement and performance management. **International Journal of Production Economics**, Amsterdam, v. 41, n.1-3, p. 23-35, 1995.
- LEIDEN RANKING. Available at: <https://www.leidenranking.com/>. Accessed on: Sept. 29, 2024.
- LIAO, Y. K.; MAULANA SUPRAPTO, R. R. An empirical model of university competitiveness and rankings: The effects of entrepreneurial behaviors and dynamic capabilities. **Asia Pacific Management Review**, v. 29, n. 1, p. 34–43, Mar. 1, 2024.
- LIMA, E. O., SILVA, J. M. **Student Entrepreneurship in Brazil 2023 – GUESSS National Report**. São Paulo: ANEGEPE and APOE Group, 2024.
- LIMA, M. O uso da entrevista na pesquisa empírica. In: Sesc São Paulo/CEBRAP, **Métodos de pesquisa em Ciências Sociais: Qualitative Block**. São Paulo: [...], 2016, pp. 24-41.
- LIN, D. C.; SHEN, L. M. “Ecological Chain” Cultivation Model of Youth Maker in Universities Based on Needs Analysis. **International Journal Of Emerging Technologies In Learning**, v. 14, n. 8, p. 167–180, 2019.
- LLORENTE-PORTILLO, C. *et al.* Entrepreneurial intention development: The contribution of specialized entrepreneurship academic programs. **Tuning Journal For Higher Education**, v. 11, n. 2, 2024.
- LOBO, C. E. d’A. V. **Aplicação do Projeto Axiomático para o Desenvolvimento de Sistemas de Medição de Desempenho para Manufatura**. Thesis (Doctorate). Department of Materials and Manufacturing. Faculty of Mechanical Engineering. Postgraduate Program in Mechanical Engineering. Campinas: State University of Campinas, 2003. 168p.
- LOUWRENS, L.-A.; SOLOMON, G.; PETTERSEN, I. B. Exploring the pathway of academic entrepreneurs: The case of Stellenbosch University. **Southern African Journal of Entrepreneurship and Small Business Management**, v. 15, n. 1, 2023.
- LU, Q. Q. *et al.* Research on quality evaluation of innovation and entrepreneurship education for college students based on random forest algorithm and logistic regression model. **Peerj Computer Science**, v. 9, 2023.
- LUNDQVIST, M.; WILLIAMS, K. Promoting and measuring university-based innovation and entrepreneurship. **Regional Frontiers of Entrepreneurship Research**, pp. 573-592, 2006.

LYNCH, K. New managerialism, neoliberalism and ranking. **Ethics in Science and Environmental Politics**, 13(2), p. 141–53, 2013.

MALAVSKI, O. S.; LIMA, E. P. de; COSTA, S. E. G. da. Modelo para a mensuração do capital intelectual: uma abordagem fundamentada em recursos. **Produção**, v. 20, n. 3, pp. 439-454, 2010.

MARCONI, M. A.; LAKATOS, E. V. **Fundamentos de metodologia científica**. 5th ed., São Paulo: Editora Atlas, 2003.

MARGINSON, S. **Higher education and growing inequality**. Academic Matters. Published in: Jan. 2016. Available at: <https://academicmatters.ca/2016/01/higher-education-and-growing-inequality>. Accessed on: Jan. 17, 2025.

MARTINS, R. A. **Sistemas de medição de desempenho**: um modelo para estruturação do uso. Thesis (Doctorate). Polytechnic School. Graduate Program in Production Engineering. São Paulo: University of São Paulo, 1998. 270p.

MAXIMIANO JÚNIOR, M. (ed.). **Indicadores brasileiros de extensão universitária**. Campina Grande: Federal University of Campina Grande Press (EDUFCG), 2017.

MCCARTHY, I. P., SILVESTRE, B. S., von NORDENFLYCHt, A., BREZNITZ, S. M. A typology of university research park strategies: What parks do and why it matters. **Journal of Engineering and Technology Management**, 47, 110-122, 2018. <https://doi.org/10.1016/j.jengtecman.2018.01.004>.

MENSHIKOV, V. *et al.* Entrepreneurial Talent: The Baltics In The Mirror Of International Studies. **Entrepreneurship And Sustainability Issues**, v. 10, n. 2, p. 274–293, 2022.

MICROSOFT 365 COPILOT CHAT. **Based on the following dimensions, group them using natural language BERT**. GPT-5. Artificial Intelligence. Available at: <https://m365.cloud.microsoft/chat/>. Accessed on Aug. 21, 2025.

MINEIRO, A. A. da C. **Hélice Quádrupla e Quintupla e seus Relacionamentos em Parques Científico-Tecnológicos consolidados no Brasil**. Thesis (Doctorate). Graduate Program in Administration. Lavras: Federal University of Lavras, 2019. 259p.

MISIAK-KWIT, S.; WISCICKA-FERNANDO, M.; FERNANDO, K. S. D. The Symbiotic Mutualism between Co-Creation and Entrepreneurship. **Sustainability**, v. 13, n. 11, 2021.

MOLAS-GALLART, J., SALTER, A., PATEL, P., SCOTT, A., DURAN, X. **Measuring Third Stream Activities. Final Report to the Russell Group of Universities**. Brighton: Science and Technology Policy Research (SPRU), University of Sussex, 2002.

MORAES, G. H. S. M. D., SPERS, E. E., MENDES, L., SILVA, H. M. R. D. Corporate entrepreneurship at the university: the influence of managerial support, autonomy, and reward on the innovative behavior of university professors, **Journal of Entrepreneurship in Emerging Economies**, v. 15, n. 2, pp. 404-424, 2023, doi: 10.1108/JEEE-07-2021-0287.

MOSTERT, S. P., ELLENBROEK, S. P., MEIJER, I., VAN ARK, G., KLASSEN, E. C. Societal output and use of research performed by health research groups. **Health Research Policy and Systems**, 8, 30, 2010. doi:10.1186/1478-4505-8-30.

NCEE – National Council for Entrepreneurship in Education. Available at: <https://ncee.org.uk/>. Accessed on: Jan. 22, 2025.

NEELY, A.; ADAMS, C. **Perspectives on performance: the performance prism**. Centre for Business Performance, School of Management. Cranfield: Cranfield University, 2000.

NEELY, A. *et al.* Performance measurement system design: A literature review and research agenda. **International Journal of Production Economics**. no. 4, pp. 80-116, 1995.

NEELY, A. *et al.* Performance measurement system design: developing and testing a process-based approach. **International Journal of Operations & Production Management**, v. 20, no. 10, pp. 1119-1145, 2000.

NEELY, A.; ADAMS, C.; KENNERLEY, M. **The Performance Prism: The Scorecard for Measuring and Managing Business Success**. [S.l.]: Pearson Education, 2002, 377p.

NTU – National Taiwan University. Available at: <https://nturanking.csti.tw/about/introduction>. Accessed on: Sept. 29, 2024.

Oboard – OKR Software. **History of OKR and KPI: From the XIX Century to the Digital Age**. Available at: <http://oboard.io/infographics/kpi-okr-history#:~:text=The%20KPI%20history%20began%20earlier,updated%20and%20popularize%20these%20concepts..> Accessed on: April 14, 2025.

OECD – Organization for Economic Cooperation and Development. **A Guiding Framework for Entrepreneurial Universities**. [S.l.]: OECD, 2012.

OECD – Organization for Economic Cooperation and Development. **HEInnovate: Encouraging entrepreneurship through higher education**. Available at: <https://www.oecd.org/en/about/programmes/skills-for-smes-and-entrepreneurs/heinnovate-encouraging-entrepreneurship-through-higher-education.html>. Accessed on: Jan. 22, 2025.

OLIVEIRA, J. M. de. Empreendedorismo e transferência tecnológica na academia norte-americana. **Radar - Tecnologia, Produção e Comércio Exterior**, Institute of Applied Economic Research (Ipea), no. 36, 2014.

ONU – Organização das Nações Unidas. **Os Objetivos de Desenvolvimento Sustentável no Brasil**. Available at: <https://brasil.un.org/pt-br/sdgs/4>. Accessed on: Dec. 12, 2024.

ORDORIKA, I., LLOYD, M. **A decade of international university rankings: A critical perspective from Latin America**. In P.T.M. Marope, P.J. Wells, & E. Hazelkorn (Eds.), 2013.

O'SHEA, R. *et al.* Universities and technology transfer: a review of academic entrepreneurship literature. **Irish Journal of Management**, v. 25, n. 2, 2004.

OZARALLI, N., RIVENBURGH, N. K. Entrepreneurial intention: antecedents to entrepreneurial behavior in the USA and Turkey, **Journal of Global Entrepreneurship Research**, v. 6, n. 1, 2016, doi: 10.1186/s40497-016-0047-x.

PAGE, M. J.; MCKENZIE, J. E.; BOSSUYT, P. M.; BOUTRON, I.; HOFFMANN, T. C.; MULROW, C. D.; *et al.* **The PRISMA 2020 statement**: an updated guideline for reporting systematic reviews. *BMJ* 2021; 372:n71. doi: 10.1136/bmj.n71

PHILPOTT, K., DOOLEY, L., O'REILLY, C., LUPTON, G. The entrepreneurial university: Examining the underlying academic tensions. **Technovation**, volume 31, p. 161–70, 2011.

PICKERNELL, D. *et al.* Entrepreneurial university strategies in the UK context: towards a research agenda. **Management Decision**, v. 57, n. 12, p. 3426–3446, 2019.

PITCHBOOK. **PitchBook Universities**: Top 100 colleges ranked by startup founders. Published: Aug. 30, 2024. Available at: <https://pitchbook.com/news/articles/pitchbook-university-rankings>. Accessed: Jan. 27, 2025.

PITSO, T. Invigorating innovation and entrepreneurship: insights from selected South African and Scandinavian universities. **Southern African Journal of Entrepreneurship and Small Business Management**, v. 11, n. 1, pp. 1-9, 2019.

PRADO, A. F. B. A. Estudo do ranking acadêmico multidimensional U-Multirank. **Estudos em Avaliação Educacional**, 34, 2023. https://doi.org/10.18222/eae.v34.9117_port.

PRINCETON REVIEW. **Entrepreneurship Rankings**: Our Methodology. Available at: <https://www.princetonreview.com/college-rankings/top-entrepreneur/methodology>. Accessed on: Jan. 22, 2025.

PUPP, Z.; FILEP, B. The impact of global socio-economic changes on the regional role of universities. **Economic Annals-XXI**, v. 190, n. 5–6, p. 33–47, 2021.

QS – Quacquarelli Symonds. Available at: <https://www.topuniversities.com/university-rankings>. Accessed on: Sept. 29, 2024.

REUTERS. **Methodology**. Available at: <https://www.reuters.com/graphics/AMERS-REUTERS%20RANKING-INNOVATIVE-UNIVERSITIES/0100B2JN1VY/>. Accessed on: Jan. 27, 2025.

RIGHETTI, S. **Which is the best? Origin, indicators, limitations, and impacts of university rankings**. Thesis (Doctorate). Institute of Geosciences. Campinas: State University of Campinas, 2016. 230 p.

RIGHETTI, S. **The game of rankings**: how they came about and what the main university rankings in the world measure. 1st ed. Campinas: Estante Labjor/Nudecri/Unicamp, 2019.

ROCHA, A. K. L. D., MORAES, G. H. S. M. D., FISCHER, B. The role of university environment in promoting entrepreneurial behavior: evidence from heterogeneous regions in Brazil, **Innovation and Management Review**, v. 19, n. 1, pp. 39-61, 2021, doi: 10.1108/inmr-08-2020-0112.

ROCHA, Thiago. **Aprenda como fazer a gestão de OKR de forma correta**. Published on: Aug. 12. Available at: <https://www.rdstation.com/blog/marketing/o-que-okr/>. 2024. Accessed on: Apr. 4, 2025.

RODRÍGUEZ GUTIÉRREZ, P.I., PASTOR PÉREZ, M.D.P., ALONSO GALICIA, P.E. University entrepreneurship: how to trigger entrepreneurial intent of undergraduate students, **Journal of Science and Technology Policy Management**, v. 10, n. 4, pp. 927-950, 2021, doi: 10.1108/jstpm-04-2018-0037.

ROTHAERMEL, F. T.; AGUNG, S. D.; JIANG, L. University entrepreneurship: a taxonomy of the literature. **Industrial and corporate change**, v. 16, n. 4, pp. 691-791, 2007.

RUIZ, S. M. de A.; MARTENS, C. D. P. Universidade Empreendedora: Proposição de Modelo Teórico. **Desenvolvimento em Questão**, v. 17, n. 48, p. 121-138, 2019.

SCHOLARS AT RISK. Free to think 2019. Scholars at Risk. Schultz, M., Mouritsen, J., & Gorm, G. Sticky reputation: Analyzing a ranking system. **Corporate Reputation Review**, 4(1), 24–41. Published on April 1, 2001. <https://doi.org/10.1057/palgrave.crr.1540130>

SCHOLARS AT RISK. **SAR's response to the US executive order titled "Combating Anti-Semitism."** Scholars at Risk. Published: Dec. 13, 2019. Available at: <https://www.scholarsatrisk.org/2019/12/sars-response-to-the-us-executive-order-titled-combating-anti-semitism>. Accessed on: Jan. 5, 2025.

SCIVAL. **Benchmark all metrics**. Available at: <https://www.scival.com/benchmarking/analyse>. Accessed on: Sept. 11, 2025.

SCHMITZ, A.; URBANO, D.; DANDOLINI, G. A.; SOUZA, J. A.; GUERRERO, M. Innovation and entrepreneurship in the academic setting: a systematic literature review. **International Entrepreneurship and Management Journal**, v. 13, pp. 369-395, 2017.

SCOPUS-ELSEVIER. Available at: <http://www.scopus.com/>. Accessed on: Sept. 28, 2024.

SHANGHAI RANKING. Available at: <https://www.shanghairanking.com/rankings/arwu/2023>. Accessed on: Sept. 29, 2024.

SHI, L., YAO, X., WU, W. Perceived university support, entrepreneurial self-efficacy, heterogeneous entrepreneurial intentions in entrepreneurship education, **Journal of Entrepreneurship in Emerging Economies**, v. 12, n. 2, pp. 205-230, 2019, doi: 10.1108/jeee-04-2019-0040.

SILVA, A. F. S. Performance Prism: a tool for measuring current performance (a case study). Dissertation (Master's). School of Economics and Management. Braga: University of Minho, 2023, 178p.

SILVA, J. P. M.; GUIMARÃES, L. de O.; SILVA, S. A. da; BAËTA, A. M. C. Análise das características empreendedoras de três universidades públicas de Minas Gerais – Brasil. **Organizações em Contexto**, v. 17, n. 34, p. 59-93, 2021.

SILVEIRA, O. F. da. **Modelagem para a medição de desempenho em um sistema de gestão integrada (SGI)**. Dissertation (Master's). Technology Center. Graduate Program in Production Engineering. Santa Maria: Federal University of Santa Maria, 2015. 97p.

SINK, D. S.; TUTTLE, T. C. **Planning and measurement for performance**. Rio de Janeiro: Qualitymark, 1993.

SIR – SCImago Institutions Rankings. Available at: scimagoir.com/rankings.php. Accessed on Sept. 29, 2024.

SIRITEERAWASU, W.; NIRAMITCHAINONT, P. The scenarios of entrepreneurial university in 2030: A case study of Thai private universities. **Kasetsart Journal of Social Sciences**, v. 43, n. 1, p. 194–200, Jan. 1, 2022.

SOAM, S. K. *et al.* Students' Perspectives on Entrepreneurship and Its Intention in India. **Sustainability**, v. 15, n. 13, 2023.

SOBREIRA NETTO, F. Medição de Desempenho Organizacional: um estudo das vantagens e desvantagens dos principais sistemas sob as óticas teórico-acadêmica e de práticas de mercado. In: XXXI ANPAD Meeting, 2007, Rio de Janeiro. Proceedings. Rio de Janeiro: ANPAD, 2007, pp. 1-16.

SPONSLER, B. A. **The Role and Relevance of Rankings in Higher Education Policymaking**: Issue Brief. Institute for Higher Education Policy. Sept. 2009.

STACK, M. **Global university rankings and the politics of knowledge**. University of Toronto Press, 2021. Available at: <https://emmahardenwolfson.com/wp-content/uploads/2021/05/global-university-rankings-and-the-politics-of-knowledge-ed-stack-2021-whole-book.pdf>. Accessed on: Aug. 23, 2024.

STAFFORD, E. R., HARTMAN, C. L. **NGO-initiated sustainable entrepreneurship and social partnership: Greenpeace's "Solutions" campaign for natural refrigerants in North America**, in Seitanidi, M. M. & Crane, A. (Eds.) *Social Partnerships and Responsible Business: A research handbook*. London: Routledge, 2014.

STEWART, T. **Intellectual Capital: The New Wealth of Organizations**. Rio de Janeiro: Campus, 1998.

SVEIBY, K. E. **The new wealth of organizations: managing and evaluating knowledge assets**. Rio de Janeiro: Campus, 1998.

TAYLOR, M., PERAKAKIS, P., TRACHANA, V., GIALIS, S. Rankings are the sorcerer's new apprentice. **Ethics in Science and Environmental Politics**, 13(2), 73–99, 2014. doi.org/10.3354/ese00146

TEZZA, R.; BORNIA, A. C.; VEY, I. H. Sistemas de medição de desempenho: uma revisão e classificação da literatura. **Gestão & Produção**, São Carlos, v. 17, n. 1, pp. 75-93, 2010.

THE – Times Higher Education. **Impact Rankings 2022**: methodology. Published: April 18, 2022. Available at: <https://www.timeshighereducation.com/world-university-rankings/impact-rankings-2022-methodology>. Accessed: September 29, 2024.

TRIPLE E. Available at: <https://2025.triple-e-awards.com/#:~:text=The%20Triple%20E%20Awards%20are,of%20the%20universities%20third%20mission>. Accessed on: Jan. 17, 2025.

TÜBİTAK – Türkiye Bilimsel ve Teknolojik Araştırma Kurumu. **1512**: Entrepreneurship Support Program. Available at: <https://tubitak.gov.tr/en/funds/sanayi/ulusal-destek-programlari/1512-entrepreneurship-support-program>. Accessed on: Jan. 27, 2025.

TÜBİTAK – Türkiye Bilimsel ve Teknolojik Araştırma Kurumu. **4004, 4005 ve 4007 Programları 2018/2 Çağrı Dönemi Başvuru Sonuçları**. Published on: Dec. 21, 2018. Available at: <https://tubitak.gov.tr/tr/duyuru/4004-4005-ve-4007-programlari-20182-cagri-donemi-basvuru-sonuclari>. Accessed on: Jan. 27, 2025.

UCHOA, C. E. **Elaboração de indicadores de desempenho institucional**. General Coordination of Training Programs. Brasília: National School of Public Administration, 2013. 36p.

UFV – Federal University of Viçosa. **Comunidade já pode acessar o Plano de Desenvolvimento Institucional 2024-2029**. Available at: <https://ppo.ufv.br/informativo/comunidade-ja-pode-acessar-o-plano-de-desenvolvimento-institucional-2024-2029/>. Published on: Feb. 1, 2024. Accessed on: Sept. 15, 2025.

UFV – Federal University of Viçosa. **Universidade disponibiliza Relatório de Gestão de 2024**. Available at: <https://www2.dti.ufv.br/noticias/scripts/exibeNoticiaMulti.php?codNot=43891>. Published on: April 25, 2025. Accessed on: September 11, 2025.

UKIL, M.I. Entrepreneurial anxiety: an empirical investigation in Bangladesh, **Journal of Entrepreneurship in Emerging Economies**, 2022, doi: 10.1108/ JEEE-05-2022-0143.

UNIRIO – Federal University of the State of Rio de Janeiro. **UNIRIO aprova o Plano de Desenvolvimento Institucional para o período 2022-2026**. Available at: <https://www.unirio.br/news/unirio-aprova-o-plano-de-desenvolvimento-institucional-para-o-periodo-2022-2026>. Published on: Dec. 23, 2021. Accessed on: Sept. 15, 2025.

UNIRIO – Federal University of the State of Rio de Janeiro. **Relatório de Gestão**. Available at: <https://www.UNIRIO.br/transparencia-e-prestacao-de-contas/relatorio-de-gestao>. Published on: Mar. 2025. Accessed on: Sept. 11, 2025.

UNIVERSIDADES EMPREENDEDORAS. **Metodologia**: Conheça a metodologia desenvolvida pela Brasil Júnior para o Ranking de Universidades Empreendedoras. Available at: <https://universidadesempreendedoras.org/metodologia/>. Accessed on: Jan. 27, 2025.

URAP – University Ranking by Academic Performance. Available at: <https://newtr.urapcenter.org/Methodology>. Accessed on: Jan. 22, 2025.

- US NEWS. **2024-2025 Best Global Universities Rankings**. Available at: <https://www.usnews.com/education/best-global-universities/rankings>. Accessed on: Sept. 29, 2024.
- VAN ARK, G., KLASSEN, E. C. Maatschappelijke impact van gezondheidsonderzoek. **TSG**, 85(5), 259–261, 2007.
- VAN DE BURG WAL, L. H. M.; DIAS, A.; CLAASSEN, E. Incentives for knowledge valorisation: a European benchmark. **Journal Of Technology Transfer**, v. 44, n. 1, p. 1–20, 2019.
- VARGAS, M. A.; RODRIGUES, C. M. C.; GUSBERTI, T. D. H. ALBANO, F. **Proposta de Indicadores de Desempenho para o Departamento Comercial de uma Empresa Multinacional: Um Estudo de Caso na Área de Prestação de Serviços**. Final Undergraduate Project. School of Engineering. Porto Alegre: Federal University of Rio Grande do Sul, 2011. 25 p.
- VOSS, C.; TSIKRIKTSIS, N.; FROHLICH, M. Case research in operations management. **International Journal of Operations & Production Management**, v. 22, n. 2, p. 195-219, 2002.
- WAGNER, M. L. **Análise dos métodos de avaliação do capital intelectual propostos por Stewart, Edvinsson e Malone e Sveiby: um estudo de caso em uma prestadora de serviços contábeis na cidade de Rio do Sul**. Final course project (monograph). Department of Accounting Sciences. Florianópolis: Federal University of Santa Catarina, 2006. 82p.
- WANG, Y.; MA, Y. Innovation and Entrepreneurship Education in Chinese Universities: Developments and Challenges. **Chinese Education & Society**, v. 55, n. 4-5, pp. 225-235, 2022.
- WASHINGTON MONTHLY. **2024 National University Rankings**. Available at: <https://washingtonmonthly.com/2024-college-guide/national/>. Accessed on: Jan. 15, 2025.
- WASHINGTON MONTHLY. **A Note on Methodology: Four-Year Colleges and Universities**. Available at: <https://washingtonmonthly.com/2024/08/25/a-note-on-methodology-four-year-colleges-and-universities/>. Published on: Aug. 25, 2024. Accessed on: Jan. 27, 2025.
- WEBOMETRICS. Available at: <https://www.webometrics.info/en/WORLD>. Accessed on: Sept. 29, 2024
- WEB OF SCIENCE. **Citation Report (Address)**. Available at: <https://www-webofscience-com.ez38.periodicos.capes.gov.br/wos/scielo/citation-report/030c143c-3a75-4055-9824-46cbb5127589-017ca75b47>. Accessed on: Sept. 24, 2025.
- WISNER, J. D.; FAWCETT, S. E. Linking firm strategy to operating decisions through performance measurement. **Production and Inventory Management Journal**, Third Quarter, pp. 5-11, 1991.

WONGRASSAMEE, S.; GARDINER, P. D.; SIMMONS, J. E. L. Performance measurement tools – the Balanced Scorecard and the EFQM excellence model. **Measuring Business Excellence**, Bradford, v. 7, n. 1, p. 14-29, 2003.

YANG, Y. Exploration on the Influential Factors of College Students' Innovation and Entrepreneurship Intention Based on Analytic Hierarchy Process. **International Journal of Fuzzy System Applications**, v. 13, n. 1, 2024.

YEH, C.H., Lin, H.H., Wang, Y.M., Wang, Y.S., Lo, C.W. Investigating the relationships between entrepreneurial education and self-efficacy and performance in the context of internet entrepreneurship, **The International Journal of Management Education**, v. 19, n. 3, 2021, doi: 10.1016/j.ijme.2021.100565.

YEUNG, R., Gigliotti, P., & Nguyen-Hoang, P. The impact of U.S. News College Rankings on the compensation of college and university presidents. **Research in Higher Education**, 60(1), 1–17, 2019. doi.org/10.1007/s11162-018-9501-7.

YIN, R. **Estudo de caso: planejamento e métodos**. Porto Alegre: Bookman, 2001.

ZAHEER, H., BREYER, Y., DUMAY, J. Digital entrepreneurship: an interdisciplinary structured literature review and research agenda, **Technological Forecasting and Social Change**, v. 148, 2019, doi: 10.1016/j.techfore.2019.119

ZHAO, S.; FENG, J. **Analysis of Effective Ways to Conduct Innovation and Entrepreneurship Education at Colleges and Universities**. International Conference on Education, Management, Computer and Society (EMCS), pp. 1598-1601, 2016.

APPENDICES

APPENDIX A – Articles selected for final review (Systematic Literature Review according to PRISMA guidelines)

	Publication	Author (year)	Country	Type	Study Objective/Research Question	Method/Study Characteristics	Results/Conclusions
1	The moderating effect of educational support on the relationship between self-efficacy and intention in cyber entrepreneurship	AL AMIMI & AHMAD (2023)	United Arab Emirates	Journal Of Work-Applied Management, v. 15, n. 2, p. 216–232	Investigate how cyberentrepreneurial self-efficacy and educational support influence cyberentrepreneurial intentions among individuals in the United Arab Emirates. Examine whether educational support moderates the relationship between self-efficacy and intention in the context of cyberentrepreneurship.	Online questionnaire with 283 valid responses from graduates of the three leading universities in the United Arab Emirates over the past five years.	Cyberentrepreneurial self-efficacy and educational support have a significant positive impact on cyberentrepreneurial intentions. Educational support does not alter the influence of self-efficacy on intention. Individuals with greater confidence in their digital skills (leadership, use of technology, and social media marketing) demonstrate a greater intention to start digital businesses. Educational support (internet access, ICT tools, and entrepreneurial training) directly increases the intention to engage in digital entrepreneurship.
2	Rankings universitários internacionais nos instrumentos de gestão das universidades brasileiras ranqueadas	ALVES <i>et al.</i> (2023)	Brazil	Journal of Applied Studies in Education, v. 8	Investigate whether and how Brazilian universities included in the ARWU, Leiden, QS, and THE international rankings refer to these rankings in their Institutional Development Plans (PDIs), based on data from 2022.	Analysis of 52 PDIs from a total of 54 Brazilian universities ranked in the 2020/2021 editions of the aforementioned rankings. Search for mentions of the terms “ranking” and “rankings” in the documents.	The use of rankings in PDIs is growing, but it is still uneven. Universities that have been in the rankings for longer tend to pay more attention to the topic. There is a tendency to institutionalize rankings as a management and strategic planning tool. Some universities demonstrate a critical view, recognizing rankings as useful instruments, but not as ends in themselves.
3	Inovação e empreendedorismo no ambiente acadêmico: um estudo sobre universidades empreendedoras e os resultados dos relatórios de gestão	ARAGÃO, DE JESUS and DOS SANTOS (2022)	Brazil	Research, Society and Development, v. 11, n. 15	Investigate how the entrepreneurial actions of federal universities are reflected in management reports and whether they correspond to the perception of students expressed in the Ranking of Entrepreneurial Universities (RUE).	Case study of five federal universities, one from each region of Brazil: UFPA (North); UFRN (Northeast); UnB (Midwest); UFV (Southeast); UTFPR (South). Analysis of the 2021 management reports of these institutions.	The management reports reflect the entrepreneurial actions of the universities and corroborate the perception of students expressed in the RUE. Universities are transforming themselves into entrepreneurial environments, with actions in teaching, research, extension, and innovation. There is pressure from rankings on institutions, which leads to the valorization of good practices and the pursuit of excellence. The university-

	Publication	Author (year)	Country	Type	Study Objective/Research Question	Method/Study Characteristics	Results/Conclusions
							market proximity indicator is still under-explored in management reports, representing an opportunity for improvement.
4	Gender differences in entrepreneurial attitudes and constraints: Do the constraints predict university agriculture graduates' attitudes towards entrepreneurship?	BALIYAN, MOSIA and BALIYAN (2020)	Botswana	International Journal of Higher Education, v. 9, n. 5, p. 259–273	To analyze gender differences in entrepreneurial attitudes and constraints faced by agriculture graduates in Botswana, and to verify whether these constraints can predict graduates' attitudes towards entrepreneurship.	Questionnaire with 149 students in their final year of agriculture courses at the University of Agriculture and Natural Resources in Botswana. Student's t-test for gender differences and multiple regression to predict attitudes based on constraints.	Women had more positive attitudes toward entrepreneurship than men. Men and women face the same constraints to entrepreneurship. Three constraints were significant predictors of attitudes: lack of land (greatest negative impact), high market competition, and lack of capital. These three variables explain 43% of the variation in graduates' entrepreneurial attitudes. Public policies should prioritize addressing the three main constraints (land, capital, and competition).
5	Rating of Higher Education Institutions - the Basis of Competitiveness	BAZHENKOV <i>et al.</i> (2023)	Ukraine	Review of Economics and Finance, v. 21, n. 1, p. 278–285	To investigate the role of university rankings as a tool for assessing the competitiveness of HEIs, especially in the Ukrainian context.	Analysis of official Ukrainian government documents, international rankings (QS, THE, ARWU), and literature. Assessment of the position of Ukrainian universities in the 2022 rankings.	No Ukrainian university appears in the ARWU. In the QS and THE rankings, the best positions are occupied by Sumy State University and V.N. Karazin Kharkiv National University. The creation of a national competitiveness program or strategy and the reformulation of evaluation systems are urgently needed to better position Ukrainian universities on the global stage and promote educational quality, internationalization, and innovation. Given the limitations imposed by the methodological principles, characteristics, and target audience of each ranking, the possibilities for assessing a university's competitiveness through these rankings should not be overestimated.
6	Developing the Entrepreneurial University: Factors of Influence	BEZANILLA <i>et al.</i> (2020)	Spain	Sustainability, v. 12, n. 842	To analyze the relationships between 13 factors that contribute to the development of the entrepreneurial university, grouped into three categories: (i) Contextual	Questionnaire with 48 items. Pearson correlation analysis between factors.	The external context has limited influence on the development of the entrepreneurial university in Spain. Internal resources (especially teacher training and funding) are essential. The institutional mission and strategy are key factors in driving entrepreneurship. Entrepreneurial training

	Publication	Author (year)	Country	Type	Study Objective/Research Question	Method/Study Characteristics	Results/Conclusions
					(external); (ii) Resources (internal); and (iii) Process (projects, structures, and training).		processes (curricular, extracurricular, active methodologies, and internationalization) are the most sensitive and correlated, being the main driver for the development of entrepreneurial culture.
7	Entrepreneurial University Archetypes: A Meta-Synthesis of Case Study Literature	BRONSTEIN & REIHLEN (2014)	Germany	Industry and Higher Education	Identify recurring patterns and distinct organizational archetypes that represent different forms of university entrepreneurship. Create a taxonomy that helps to understand the structures, strategies, and resources of these institutions.	Qualitative analysis of 27 case studies on entrepreneurial universities in 18 countries.	There is no single model of an entrepreneurial university. Universities tend to converge toward distinct archetypes, influenced by factors such as: (i) institutional heritage (path dependency); (ii) economic and political environment; and (iii) organizational culture and leadership. Archetypes help to understand the diversity of organizational responses to the pressure for entrepreneurship in higher education.
8	Rankings Acadêmicos e Governança Universitária no Espaço do Ensino Superior de Língua Portuguesa	CALDERÓN, WANDERCIL and MARTINS (2019)	Brazil	Book published by the National Association of Education Policy and Administration (ANPAE)	Investigate and reflect on the impacts of academic rankings on university governance in Portuguese-speaking countries (Angola, Cape Verde, Macau, Mozambique, Portugal, and Brazil), considering their national specificities and the challenges of internationalization and quality- t in higher education.	Literature review.	<ul style="list-style-type: none"> • Angola: Expansion of higher education and creation of legislation for evaluation and accreditation. Proposal to create a national ranking adapted to the local reality. • Macau: Three groups of institutions identified with different levels of alignment with international ranking criteria. New legislation expands the autonomy of HEIs. • Mozambique: National Evaluation System (SINAQES) promotes quality and but is not yet used for national ranking. UniZambeze stands out with a significant number of accredited courses. • Brazil: Rankings are poorly integrated into the strategic plans of public universities, but are used in institutional news and by private universities as a marketing tool. • Portugal: Discussion on the creation of a national ranking. Methodological challenges and the need for reliable indicators. Rankings are seen as instruments to increase international visibility.

	Publication	Author (year)	Country	Type	Study Objective/Research Question	Method/Study Characteristics	Results/Conclusions
9	A construção de universidades de classe mundial e rankings acadêmicos no espaço do Ensino Superior de língua portuguesa e em outras realidades do mundo	CALDERÓN <i>et al.</i> (2023)	Brazil	Book published by the National Association of Education Policy and Administration (ANPAE)	Analyze the development of world-class universities and the role of academic rankings, with a special focus on Portuguese-speaking countries (Angola, Cape Verde, Macau, Mozambique, Portugal, and Brazil)	Literature review.	<ul style="list-style-type: none"> • Mozambique: Rapid expansion of higher education, but with challenges in terms of quality and funding. • Brazil: Growing presence in rankings, but with low production of informative content about them. • Angola: Economic crisis and lack of transparency in public funding. • Portugal: Relationship between research funding and performance in rankings.
10	Universidades empreendedoras e ambientes de inovação: Uma proposta de sustentabilidade econômica para o ensino superior	CHAIS (2019)	Brazil	Doctoral thesis defended at the University of Caxias do Sul	Investigate how innovation environments, especially science and technology parks, can contribute to the economic sustainability of entrepreneurial universities.	Analysis using the NVivo® tool of multiple case studies – Brazil: USP (strong innovation structure, focus on health, integration with municipal government), Unicamp (high scientific production, “Unicamp spin-off” companies, strong entrepreneurial culture), UFRJ (technology park with major regional impact, outstanding research infrastructure), Feevale (community institution focused on applied innovation and local entrepreneurship); Mexico: Tecnológico de Monterrey (Tec21 model, strong internationalization, consolidated entrepreneurial culture).	<p>The thesis presents a conceptual model, validated by experts from the institutions studied, which relates:</p> <ol style="list-style-type: none"> 1. Entrepreneurial university 2. Innovation environments 3. Economic sustainability 4. Triple helix 5. University management <p>University management is essential for integrating innovation and sustainability. An entrepreneurial culture should be encouraged from the undergraduate level onwards. Interaction between universities, businesses, and government is vital for the success of innovation environments. Economic sustainability depends on clear strategies, impact indicators, and financial autonomy.</p>
11	Dimensões, características e indicadores para avaliação das	CORRÊA (2022)	Brazil	Master's thesis defended at the Federal	Define dimensions, characteristics, and indicators for evaluating Brazilian entrepreneurial	Systematic review of the literature on entrepreneurial universities. Documentary	The following were identified: 13 evaluation dimensions, 61 associated characteristics, and 198 indicators for measurement. The dimensions were: Individual; Institutional;

	Publication	Author (year)	Country	Type	Study Objective/Research Question	Method/Study Characteristics	Results/Conclusions
	Universidades Empreendedoras brasileiras			University of Santa Catarina	universities, focusing on the third university mission.	analysis of 8 rankings and 3 frameworks. Focus group with experts for validation and refinement of data.	Contextual; Organizational; Entrepreneurial Teaching; Internationalization; Financial Resources; Entrepreneurial Culture; Research; Innovation; Extension; Infrastructure; and Impact.
12	Globalising or assimilating? Exploring the contemporary function of regionalised global university rankings in Latin America	DARWIN & BARAHONA (2023)	Chile	Higher Education	To analyze the impact of global regionalized university rankings (GUR) in Latin America, especially how they influence: the perception of higher education quality; academic and institutional practices; and the mission of Latin American universities.	Critical meta-synthesis of 57 studies published between 2013 and 2023.	Regionalized global university rankings are becoming a hegemonic force, shaping university policies and practices in Latin America. There is tension between adopting global standards and preserving local diversity and relevance. Although global rankings should not be ignored, it is essential to develop forms of evaluation that respect Latin American specificities.
13	Governing by visual shapes: university rankings, digital education platforms and cosmologies of higher education	DECUYPERE & LANDRI (2021)	Belgium and Italy	Critical Studies in Education, v. 62, n. 1, p. 17-33	Analyze the U-Multirank university ranking platform, proposing an alternative to traditional number-based approaches to evaluating higher education.	Material-semiotic analysis based on public documents, visual and functional elements of the U-Multirank platform itself.	Although U-Multirank represents an advance in terms of participation and diversity (by using multidimensional and visual rankings, avoiding the "soccer table" logic of traditional rankings), it still keeps epistemological control in the hands of the platform's developers. The authors suggest that educational platforms should allow for more experimental and democratic forms of participation, including discussions about the values and goals of higher education.
14	Facilitators of tertiary students' entrepreneurial intentions: Insights for Lesotho's national entrepreneurship policy	DICK-SAGOE <i>et al.</i> (2023)	Lesotho	Heliyon, v. 9, n. 6	To investigate the factors that influence the entrepreneurial intentions of students at the National University of Lesotho (NUL), based on the Theory of Planned Behavior (TPB), with a view to providing input for public policies to combat	Questionnaire with 930 students (620 undergraduate and 310 graduate) from 31 departments at NUL. Statistical analyses: Spearman's correlation, Mann-Whitney test to compare groups, Structural Equation Modeling with AMOS 21, validity and	To foster entrepreneurship, it is necessary to: integrate entrepreneurship disciplines into all university courses; create favorable environments with institutional support, mentoring, and financing (especially among graduate students); and involve social leaders to change cultural norms that discourage entrepreneurship. Students of Business Administration, Economics, Nutrition, Pharmacy, and Business Development showed greater entrepreneurial intent, while

	Publication	Author (year)	Country	Type	Study Objective/Research Question	Method/Study Characteristics	Results/Conclusions
					youth unemployment in the country.	reliability tests (Cronbach's α , AVE, CR).	students of History, Philosophy, Procedural Law, and French showed less entrepreneurial intent. When undergraduate students were compared with master's students, the latter showed greater entrepreneurial intent.
15	Análise dos indicadores e critérios dos rankings globais de universidades pela ótica do conceito de universidade empreendedora	DOLCIMASCULO (2020)	Brazil	Master's thesis defended at the Federal Technological University of Paraná	To analyze whether the indicators and criteria of global university rankings are aligned with the concept of entrepreneurial universities, which involves teaching, research, and extension focused on regional socioeconomic development.	Systematic review of the literature to obtain the characteristics of an entrepreneurial university, and secondary data obtained from international university rankings for information on indicators and evaluation criteria.	A total of 160 characteristics were identified, distributed across 24 institutional factors, grouped into five dimensions: academic staff; entrepreneurial culture; academic management; diversified income; and support for innovation. Global rankings still prioritize traditional indicators (research and reputation), leaving aside fundamental dimensions of the entrepreneurial university. The author proposes a review of the evaluation criteria to include aspects that better reflect the role of universities in regional development and the promotion of entrepreneurship.
16	Educação empreendedora universitária: uma proposta de modelo	DOS SANTOS (2024)	Brazil	Thesis (Doctorate) defended at the Federal University of Rio Grande do Sul	Propose a model for university entrepreneurial education that directs efforts, incentives, and motivation toward the entrepreneurial training of undergraduate students, based on institutional choreographies.	Analysis of institutional documents: websites, PDIs, Pedagogical Course Projects (PPCs) for the Administration, Agronomy, and Computer Science courses at UFRPE. Use of ATLAS.ti software for coding.	The thesis identified that the concept of institutional choreographies (Zabalza) is useful for understanding how universities organize their teaching-learning processes; and that active methodologies and institutional structures are fundamental for fostering entrepreneurship. It proposes a model based on three levels: I. Anticipation: planning and design of entrepreneurial policy. II. Implementation: use of pedagogical tools and practices. III. Product: results obtained (business initiatives generated, number of intellectual property registration applications, projects developed).
17	Scenarios of the innovative development of	DVORETSKAYA <i>et al.</i> (2023)	Russia	Frontiers In Education, v. 8	To analyze scenarios for the innovative development of higher	Statistical analysis of QS 2021 data from the top ten Russian universities.	They argue that entrepreneurial universities are inappropriate for the Decade of Science and Technology (2022-2031), stating that

	Publication	Author (year)	Country	Type	Study Objective/Research Question	Method/Study Characteristics	Results/Conclusions
	education in the context of the Russian economy's modernization: entrepreneurial universities vs. high-tech universities				education in Russia, comparing two models of universities (entrepreneurial and high-tech) and assessing which of them contributes more effectively to the modernization of the Russian economy.		high-tech universities are preferable for the innovative development of higher education in that country. They recommend focusing on the modernization of university infrastructure (a 1% increase in equipment modernization results in a 9.63% growth in R&D activity); avoiding reductions in state funding; and not prioritizing the entrepreneurial university model, as it is associated with a decline in the academic performance of Russian HEIs in the QS ranking.
18	A study of entrepreneur and innovative university index by entropy-based grey relational analysis and PROMETHEE	ELEVLI & ELEVLI (2024)	Turkey	Scientometrics, v. 129, n. 6, p. 3193–3223	To evaluate and compare the performance of universities in Turkey in terms of entrepreneurship and innovation, using different multi-criteria decision-making (MCDM) methods.	All 50 universities ranked in the 2022 Entrepreneurial and Innovative Universities Index (EIUI) were evaluated, considered the best among 208 in the country.	The EIUI considers 23 criteria grouped into four dimensions. Three weightings of the criteria were used: weights defined by TUBITAK (Turkey's research agency), weights calculated using the Shannon entropy method, and equal weights for all criteria. The rankings of Turkish universities varied significantly depending on the MCDM and the weights used. The variation in the weights of the criteria had a greater impact on the results than the MCDM method used.
19	Entrepreneurial university dynamics: Structured ambivalence, relative deprivation and institution-formation in the Stanford innovation system	ETZKOWITZ <i>et al.</i> (2018)	United States	Technological Forecasting & Social Change	To analyze the evolution of Stanford University as a model of entrepreneurial university, highlighting the challenges, contradictions, and organizational innovations that arise in this process.	Participant observation at Stanford's Office of Technology Licensing (OTL). Analysis of historical archives on technology transfer. Interviews with administrators, professors, students, and founders of entrepreneurial initiatives. Case studies developed by students in Stanford's STS 186 (Science, Technology, and Society) course.	Stanford represents an evolving model of an entrepreneurial university, but it faces the "paradox of success," meaning that success can hide flaws and gaps in the innovation system. To recognize and overcome these gaps, it is important to promote a more inclusive and systematic culture of innovation. Concept of "structured ambivalence": the tension between academic and commercial goals can generate innovation, provided there are flexible organizational structures and institutional support.

	Publication	Author (year)	Country	Type	Study Objective/Research Question	Method/Study Characteristics	Results/Conclusions
20	Towards "meta-innovation" in Brazil: The evolution of the incubator and the emergence of a triple helix	ETZKOWITZ, DE MELLO and ALMEIDA (2005)	Brazil and the United States	Research Policy, v. 34, p. 411-424	Analyze the evolution of the incubator movement in Brazil and how it contributed to the emergence of a "meta-innovation" system. Investigate how the triple helix model was adapted to the Brazilian context, generating different types of incubators with technological, social, and economic functions.	Documentary analysis of databases from the National Association of Entities Promoting Innovative Enterprises (Anprotec). Study of incubator types: technological, traditional, cooperative, mixed, and private. Interviews with incubator managers, representatives of industrial associations, government agencies, and investors. Focus groups with teachers involved in entrepreneurial education.	In 2003, Brazil had 237 incubators, distributed across all regions, with around 2,000 incubated companies and 15,000 direct jobs. The incubator movement stimulated the creation of technology parks and regional innovation networks. Brazil transformed the original model of technology-based incubators into a multifunctional tool, also applicable to popular cooperatives, NGOs, and cultural sectors. The incubator movement stimulated the creation of technology parks and regional innovation networks. Emergence of a meta-innovation system: innovation driven by top-down (government), bottom-up (universities and municipalities), and lateral (industrial associations and NGOs) initiatives.
21	Los rankings y sus usos en la gobernanza universitaria	FANELLI & CARRANZA (2018)	Argentina	CTS Magazine, v. 13, n. 37, p. 95-112	To analyze how university rankings influence the governance of higher education institutions, based on international experience. To investigate the impacts of these rankings on decisions made by internal agents (such as university managers) and external agents (such as governments and students).	Literature review and international case studies.	Rankings have three main uses in university governance: guidance for students, public policy formulation, and benchmarking and institutional strategic planning. Although they function as indicators of quality in a scenario of asymmetric information, university rankings are reductionist and favor a single model of elite research universities. Their use can intensify the stratification of the higher education system, promoting institutional isomorphism and marginalizing alternative models of universities.
22	Consensus study on factors influencing the academic entrepreneur in a middle-income country's university enterprise	FARRELL <i>et al.</i> (2024)	South Africa	Journal Of Entrepreneurship In Emerging Economies, v. 16, n. 5, p. 1409–1430	To investigate the personal characteristics, skills, barriers, and facilitating factors that influence the entrepreneurial behavior of academics at a university in South Africa.	Modified Delphi, applied to a panel of 31 entrepreneurial academics. Nominal Group Technique, used to identify challenges faced by academic entrepreneurs and propose solutions.	The KEI model needs to be adapted for middle- and low-income countries, where structural, economic, and environmental barriers are more significant. Universities should actively support academic entrepreneurs through mentoring, leadership training, collaborative networks, and facilitated access to financing.

	Publication	Author (year)	Country	Type	Study Objective/Research Question	Method/Study Characteristics	Results/Conclusions
						Adaptation of Krueger's entrepreneurial intentions model (KEI), incorporating contextual and activation mitigating factors .	
23	Innovation in the First Mission of Universities	FERNÁNDEZ <i>et al.</i> (2018)	Spain	Journal of Innovation Management, v. 6, n. 4, p. 32-48	Propose a new characterization of innovative universities, differentiating them from so-called entrepreneurial universities.	Review of the literature on entrepreneurial universities and case studies of universities that exemplify innovative practices in the educational mission: TUSUR (Russia), Stellenbosch (South Africa), Monterrey (Mexico), and Aalto University (Finland).	The term “entrepreneur” is considered limited, as it focuses mainly on business creation and technology transfer. In contrast, university innovation involves change, novelty, and social return, being more comprehensive and requiring interaction with stakeholders as an indispensable element for its success. The third and fourth university missions (knowledge transfer and social responsibility, respectively) are seen as natural extensions of the two core missions of teaching and research.
24	Indexing third stream activities in UK universities: exploring the entrepreneurial/enterprising university	FULLER, BEYNON and PICKERNELL (2019)	United Kingdom	Studies In Higher Education, v. 44, n. 1, p. 86–110	To investigate and classify the third stream activities (TSA) of UK universities, focusing on the concepts of entrepreneurial university (focused on innovation and knowledge exploitation) and broad entrepreneurial university (also focused on entrepreneurial education and graduate entrepreneurship).	Data from the 2009/2010 Higher Education Business and Community Interaction Survey (HE-BCIS) of 144 British universities were used. Two indices were created: <ul style="list-style-type: none"> • Entrepreneurial University Index: based on original data. • Broad Entrepreneurial University Index: based on log-transformed data to reduce distortions caused by universities focusing on few activities. 	University Knowledge Exploration Activities is the factor most associated with Russell Group universities (more research-intensive). Spin-offs by staff and graduates are more common in universities outside the Russell Group, indicating greater diversity of entrepreneurial activities. The index based on log-transformed data favors universities with a more balanced distribution of entrepreneurial activities, while the index with original data favors those with high intensity in University Knowledge Exploration Activities. Universities such as Cambridge, Cardiff, and Aston improved their position in the log-transformed index by presenting more diversified activities. Different types of third mission activities have different values for universities and public policy, and the concentration of

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							funding in research-intensive universities may limit the diversity of economic impact.
25	Identifying groups of entrepreneurial activities at universities	FULLER & PICKERNELL (2018)	United Kingdom	International Journal Of Entrepreneurial Behavior & Research, v. 24, n. 1, p. 171–190	To investigate whether entrepreneurial activities carried out by UK universities can be grouped statistically, in order to better understand the different types of university involvement with entrepreneurship.	Data from the 2009/2010 Higher Education Business and Community Interaction Survey (HE-BCIS) from 144 British universities were used. Principal Component Analysis (PCA) was applied to 35 variables related to third mission activities.	Four distinct groups of entrepreneurial activities were identified: 1. University Knowledge Exploitation Activities: includes research contracts, patents, disclosures, and university-owned spin-offs. This represents the broadest and most traditional group of entrepreneurial activities. 2. Employee Spin-offs: companies created by faculty members, with no direct link to the university's intellectual property. 3. Non-University Spin-offs: companies based on university IP, but whose ownership has been transferred. 4. Graduate Startups: businesses started by former students with formal support from the university, related to entrepreneurial education.
26	Rankings universitarios, ni ángeles ni demonios: críticas y usos por parte de grupos de interés	GANGA-CONTRERAS <i>et al.</i> (2023)	Chile	Journal of the Academy, no. 9, pp. 158-183	To present an analysis of university rankings, highlighting their main criticisms and the uses that different interest groups make of these institutional evaluation tools.	Review of scientific literature.	Rankings are valuable as accountability tools in higher education and can stimulate institutional improvements. However, it is essential to consider their methodological limitations and avoid them becoming the sole evaluation criterion. The study recommends improving rankings with more diverse and contextualized indicators, respecting the missions and realities of each institution.
27	Rankings and the battle for world-class excellence	HAZELKORN (2008)	Germany, Australia, and Japan	Higher Education Management and Policy, v. 21, n. 1, p. 1-22	To investigate how global university rankings influence institutional strategies and policy decisions in higher education, especially in relation to the pursuit of academic excellence.	Survey of 202 institutions conducted in 2006; interviews with leaders and stakeholders from universities in Germany, Australia, and Japan; comparative analysis.	Rankings are used by universities and governments as tools for management, strategic planning, and justification for educational reforms, influencing decisions on funding, institutional structure and organization, faculty recruitment, and institutional marketing.

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							Institutions are restructuring departments, creating centers of excellence, and prioritizing scientific areas with greater visibility in the rankings. The pressure for performance has generated side effects, such as the devaluation of the humanities and increased competition for high-performing students and teachers.
28	Impact of Global Rankings on Higher Education Research and the Production of Knowledge	HAZELKORN (2009)	Ireland and France	UNESCO Forum on Higher Education, Research and Knowledge	Analyze how global rankings affect knowledge production in universities and influence the definition of what is considered excellent research.	Study based on previous research by that author. Review of the main ranking systems and their indicators.	There is a risk of distortions in scientific and educational policy, with resources concentrated in a few universities and other forms of knowledge production marginalized. Institutions are adapting their strategies to improve their positions in the rankings, which includes mergers, the creation of research centers, and a focus on publications in English.
29	World-Class Universities or World Class Systems?: Rankings and Higher Education Policy Choices	HAZELKORN (2013)	Ireland and France	Chapter from the book "Rankings and Accountability in Higher Education: Uses and Misuses," published by UNESCO	Discuss whether higher education policies should focus on creating world-class universities or world-class higher education systems.	Study based on previous research by that author.	The challenge is to balance excellence in global science with a world-class higher education system – accessible to as many people as possible – rather than simply building world-class institutions. Identification of two policy models: (i) Neoliberal model: concentration of resources in a few elite universities; and (ii) Social democratic model: strengthening of the entire education system. There is a need to create more comprehensive evaluation systems that value institutional diversity and promote equity and excellence.
30	Rankings in institutional strategies and processes: impact or illusion?	HAZELKORN, LOUKKOLA and ZHANG (2014)	Austria, France, Denmark, Portugal, Romania, and the United Kingdom	Book published by the European University Association	Investigate how university rankings influence institutional strategies and decision-making processes at European HEIs.	The project was entitled RISP (Rankings in Institutional Strategies and Processes) and consisted of the following stages: online survey of 171 HEIs in 39 European countries; technical visits to six	Rankings are widely monitored by institutions, although they are not always an explicit part of institutional strategy. Despite methodological criticisms, rankings have raised awareness about quality, transparency, and competitiveness in higher education. Institutions tend to use rankings as a complementary tool, rather than as the sole

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						universities in Austria, France, Denmark, Portugal, Romania, and the United Kingdom; roundtable with university managers and stakeholders to validate data and exchange experiences.	criterion for evaluation. There is a diversity of rankings (national, international, disciplinary), and their impact varies according to the institutional and national context. Rankings have a real impact on institutions, but their use must be strategic and critical. They should not replace internal evaluations or decisions based on the institutional mission.
31	Assessing Academics' Third Mission Engagement by Individual and Organisational Predictors	KARLSDOTTIR <i>et al.</i> (2023)	Iceland	Administrative Sciences, v. 13, n. 1	To investigate how individual and organizational factors influence academics' propensity to engage in third mission activities in the context of Icelandic universities.	Questionnaire with 183 academics from seven Icelandic universities. Statistical analysis by multiple regression.	<p>Significant factors:</p> <ul style="list-style-type: none"> • Openness to experience: positive predictor for almost all third mission activities. • Academic performance: positively influences community activities, scientific communication, and commercialization. • Experience outside academia: associated with applied research and commercialization. • STEM and health disciplines: more engaged in applied research and commercialization activities; less in scientific communication. <p>Non-significant factors: gender, time devoted to teaching, and academic position do not significantly influence academics' participation in third mission activities.</p>
32	Entrepreneurial capacity of universities and its impact on regional economic growth	KOCHETKOV, LARIONOVA and VUKOVIC (2017)	Russia	Economy of Regions, v. 13, n. 2, p. 477–488	To analyze the entrepreneurial capacity of Russian universities and its impact on regional economic growth.	Review of international university rankings. Statistical analysis of the correlation between technology transfer indicators (patents, licenses, startups, revenues) and positions in the rankings. Comparative case study between universities in the	Most Russian universities are under federal jurisdiction, hindering their integration with regional economies, and perform modestly in international rankings. Their technology transfer indicators (international patents, licenses, startups) are significantly below global standards. Public funding is centralized, with low participation from regional budgets, limiting the ability to respond to local demands. Tomsk universities show greater alignment between university research and regional technological priorities.

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						Novosibirsk and Tomsk regions.	
33	Enhancing student learning in innovation competitions and programs	KONAK <i>et al.</i> (2024)	United States	European Journal Of Engineering Education	Investigate how student innovation competitions and programs (ICPs) influence the development of technical, entrepreneurial, and innovative mindset skills among university students.	Literature review, online questionnaire with 194 students from two universities in the United States who participated in ICPs, statistical analysis.	These initiatives are effective in developing technical, entrepreneurial, and innovative mindset skills in students. The type of competition/program influences skill development: competitions/programs that focused on solutions, not just technical skills, and that incorporated elements of entrepreneurship and social impact promoted greater development of innovation, empathy, and stakeholder communication skills.
34	Are entrepreneurs made on campus? The impact of entrepreneurial universities and graduates' human capital on graduates' occupational choice	KRABEL <i>et al.</i> (2018)	Germany	Journal of International Entrepreneurship, v. 16, n. 4, p. 456–485	To investigate how the entrepreneurial orientation of universities and the human capital of graduates influence the occupational choice of graduates, especially the decision to become self-employed (entrepreneurs) after graduation.	Ten thousand graduates from German universities (graduation years 2007 and 2008) were consulted, and data from the entrepreneurial orientation ranking of German universities (LMU München) was used. The statistical analysis used probit and Heckman regression models to correct for selection bias and estimate the probability of entering self-employment.	Formal entrepreneurial education had no significant effect, and students' previous practical experience is more relevant to entrepreneurial intent than traditional academic indicators (such as grades and international mobility). University policies that foster external networks with entrepreneurs and practical examples (history of university spin-offs) may be more effective than theoretical courses. Women and graduates with children are less likely to become self-employed. The rate of entrepreneurs in the university region did not significantly influence graduates' decisions. The university's orientation toward entrepreneurship positively influences graduates' professional choices.
35	An empirical model of university competitiveness and rankings: The effects of entrepreneurial behaviors and dynamic capabilities	LIAO & MAULANA SUPRAPTO (2024)	East Asian and Southeast Asian countries	Asia Pacific Management Review, v. 29, n. 1, p. 34–43	To investigate how entrepreneurial behaviors and dynamic capabilities influence the competitive advantage and performance of universities, especially in terms of their international rankings.	Sample consisting of 240 universities from 13 countries in East Asia and Southeast Asia, using secondary data from the <i>QS World University Rankings</i> and the SciVal database. Hypothesis	Universities with greater proactivity and innovation, combined with adaptability and collaboration capabilities, tend to achieve higher positions in international rankings. Entrepreneurial behaviors (innovation and proactivity) have a direct and significant impact on: the university's dynamic capabilities (market exposure, strategic collaboration, and knowledge generation); its

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						testing using multiple regression models.	competitive advantage (reputation, human capital, and scientific output); its performance (ranking position). Dynamic capabilities also positively influence competitive advantage. Competitive advantage is strongly associated with performance in rankings. The interaction between entrepreneurial behaviors and dynamic capabilities generates a synergistic effect that enhances the performance of universities.
36	Student Entrepreneurship in Brazil 2023 GUESSS National Report	LIMA & SILVA (2024)	Brazil	National Association for Studies in Entrepreneurship and Small Business Management	To analyze the entrepreneurial spirit of Brazilian university students, investigating their career intentions, entrepreneurial activities, influencing factors, and subjective well-being.	Internationally standardized structured questionnaire (the survey is part of the international GUESSS project, which seeks to understand student entrepreneurship in different countries). Administered online to 7,447 students from more than 30 Brazilian higher education institutions.	For students: take advantage of the university environment for networking, consider entrepreneurship as a career alternative, and seek entrepreneurial training. For universities and policymakers: promote entrepreneurial education in all areas, create inclusive environments, and support social entrepreneurship as a tool for transformation.
37	“Ecological Chain” Cultivation Model of Youth Maker in Universities Based on Needs Analysis	LIN & SHEN (2019)	China	International Journal Of Emerging Technologies In Learning, v. 14, n. 8, p. 167–180	To propose a systematic model for training young entrepreneurs ("Youth Makers") in Chinese universities, based on a needs analysis.	Questionnaires and interviews with two groups of 100 Chinese students each: young who have already started their own businesses and students with entrepreneurial intentions. Analysis via AHP to classify and prioritize suggestions for improving the training model.	Current training is considered unsystematic and fragmented. Proposal for a training model for young entrepreneurs based on an "ecological chain", which includes: <ul style="list-style-type: none"> • A progressive four-year system, aligned with the academic and psychological development of students; • Special courses that integrate professional and entrepreneurial training; • A team of qualified tutors, focused on practical guidance; • A scientific and efficient incubator, led by the university, with comprehensive services to support entrepreneurship;

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							<ul style="list-style-type: none"> • A focus on quality projects, with the dissemination of success stories to inspire other students. <p>The motivation to become an entrepreneur is strongly linked to the influence of peers and the compatibility between the university course and the business project.</p> <p>The desire to become an entrepreneur arises early (by the 2nd year), but implementation occurs later (3rd or 4th year). Students identify the following as essential skills: professional knowledge, communication skills, viable projects, initial financing, and practical guidance.</p>
38	Entrepreneurial intention development: The contribution of specialized entrepreneurship academic programs	LLORENTE-PORTILLO <i>et al.</i> (2024)	Mexico	Tuning Journal For Higher Education, v. 11, n. 2	To investigate how specialized academic programs in entrepreneurship influence the entrepreneurial intention of university students and to understand whether exposure to specific educational methodologies increases the intention to become an entrepreneur.	Questionnaires with 25 students in the 4th semester of the Bachelor's Degree in Entrepreneurship at Tecnológico de Monterrey. Statistical tests such as Shapiro-Wilk, Spearman, and Friedman, using SPSS software.	The courses did not substantially alter the students' entrepreneurial intention. The combination of theoretical and procedural methodologies was not sufficient to generate significant changes in entrepreneurial intention. More realistic and problem-based approaches may be more effective in stimulating entrepreneurial attitudes and intentions. Students already had high entrepreneurial intent at the beginning of the semester. Entrepreneur 1 attitude showed a positive correlation with intent at the end of the period. Perceived Behavioral Control had a positive correlation with intent only at the beginning of the semester but decreased at the end of the period.
39	Exploring the pathway of academic entrepreneurs: The case of Stellenbosch University	LOUWRENS, SOLOMON and PETERSEN (2023)	South Africa	Southern African Journal of Entrepreneurship and Small Business Management, v. 15, n. 1	To analyze the path of research commercialization by academics at Stellenbosch University and understand the factors that facilitate and hinder academic entrepreneurship.	Case study. Fourteen semi-structured interviews were conducted with entrepreneurial academics, members of the university administration, and managers of the	Academics want their research to have a social impact beyond scientific publication, but there is tension between publishing and commercializing, as only publication is considered in performance indicators. Awareness of the possibility of commercializing research is limited and influenced by previous experiences, mentors,

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						technology transfer office and incubator.	informal networks, and exposure to entrepreneurial environments. The intellectual property structure and profit sharing with the university are also seen as demotivating factors in the pursuit of research commercialization.
40	Research on quality evaluation of innovation and entrepreneurship education for college students based on random forest algorithm and logistic regression model	LU <i>et al.</i> (2023)	China	Peerj Computer Science, v. 9	To evaluate the quality of innovation and entrepreneurship education among college students in China, using a hybrid machine learning model combining Random Forest (RF) and Logistic Regression (LR).	Questionnaire applied to students from 25 Chinese HEIs. Dimensions evaluated, each with specific indicators, totaling 17 indicators: curriculum design; training and skills development; resources; acquisition of teaching talent; and entrepreneurial environment.	When analyzing the quality index for each dimension, it was found that the strongest dimension is skills training and the weakest is the entrepreneurial environment. After analyzing the performance of the proposed model, it was concluded that it is effective for assessing the quality of education in innovation and entrepreneurship.
41	Entrepreneurial talent: the Baltics in the mirror of international studies	MENSHIKOV <i>et al.</i> (2022)	Latvia, Lithuania, and Estonia	Entrepreneurship And Sustainability Issues, v. 10, n. 2, p. 274–293	To empirically confirm how education influences the development of entrepreneurial talent and, consequently, economic growth in the Baltic countries.	Surveys were conducted with students and data from the World Economic Forum, the Global Talent Competitiveness Index (GTCI), and GEM were analyzed.	Lithuania stands out in entrepreneurial infrastructure and R&D transfer and leads among middle-income countries in several GEM entrepreneurship indicators. Estonia leads in talent competitiveness and educational quality. Latvia faces challenges, especially in entrepreneurial education in schools and after school. Poorer countries face difficulties in cultivating and retaining talent. Countries with better education attract and retain more talent.
42	The Symbiotic Mutualism between Co-Creation and Entrepreneurship	MISIAK-KWIT, WISCICKA-FERNANDO and FERNANDO (2021)	China, Georgia, Poland, Romania, and Sri Lanka.	Sustainability, v. 13, n. 11	Investigate the relationships between co-creation experience, entrepreneurial mindset, and entrepreneurial intentions, with a focus on sustainability.	Questionnaire with 500 business students (100 from each country). Statistical analysis using Spearman's correlation coefficient.	Collaborative experiences can stimulate the desire to start a business, since the experience of co-creation is strongly associated with the intention to become an entrepreneur. They also found that one in five respondents was uncertain about their own career plans and whether or not they had an entrepreneurial mindset, indicating a gap in the educational system. In this regard, the authors recommend raising awareness among

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							students. In China, research shows that the support for entrepreneurship offered by universities has a positive impact on entrepreneurial intentions.
43	Entrepreneurial university strategies in the UK context: towards a research agenda	PICKERNELL <i>et al.</i> (2019)	United Kingdom	Management Decision, v. 57, n. 12, p. 3426–3446	To investigate how UK universities structure their knowledge exchange strategies with small and medium-sized enterprises.	Data from the 2015/2016 Higher Education Business and Community Interaction Survey (HE-BCIS) from 162 British universities were used.	<p>The most relevant activities for measuring the entrepreneurial character of universities are: consulting, continuing professional development, software and non-software licensing, and contract research. Proposal of four strategic archetypes that should be considered in public policies for promoting regional entrepreneurial ecosystems:</p> <ul style="list-style-type: none"> • Weak External Business Income: low external income generation with small and medium-sized enterprises; • Education-Related Focus: focus on continuing professional development, consulting, and services. These are more common in peripheral regions, where these activities have a greater impact; • Intellectual Property Exploitation Focus: focus on licensing, contract research, and spin-offs. Universities with this focus tend to be in economically stronger regions; • Broad Focus: broad strategy with multiple activities. These are more difficult to implement but can be more effective in intermediate regions.
44	The impact of global socio-economic changes on the regional role of universities	PUPP & FILEP (2021)	Hungary	Economic Annals-XXI, v. 190, n. 5–6, p. 33–47	Investigate how universities can adapt to rapid global changes while maintaining their educational and scientific mission and contributing to regional development.	Literature review; studies of triple and quadruple helix models and technology park strategies; statistical data on innovation performance, R&D spending, human resources in science and technology, among others.	The creation of innovation parks and science centers is seen as a catalyst for the knowledge-based economy and, together with entrepreneurial strategies, strengthens the role of universities as economic agents. The cultural and structural adaptation of universities is necessary to adapt to the demands of the market and society, with a focus on innovation, flexibility, and cooperation.

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45	Qual é a melhor? Origem, indicadores, limitações e impactos dos rankings universitários	RIGHETTI (2016)	Brazil	Thesis (Doctorate) defended at the State University of Campinas	Analyze how university rankings are compiled and how they influence the decisions of students and parents; university management; and public policies on higher education.	Literature review; case study of USP; analysis of three rankings: ARWU, THE, and U.S. News & World Report (Best Global Universities Rankings).	Upper-middle-class students with good academic performance use rankings to choose universities, and students who consult rankings tend to change courses or universities less often. It also found that rankings influence students seeking traditional careers (such as medicine, law, and engineering) more. From the perspective of impacts on university management, strategies for climbing the rankings include hiring award-winning professors; increasing scientific publications; internationalization (courses in English, attracting foreigners); and using rankings as an institutional marketing tool. Regarding the impact on public policy, positions in the rankings influence the distribution of public and private resources, and well-positioned universities receive more resources and continue to stand out. USP monitors rankings and uses the results for institutional communication, and there is evidence that the results influence internal decisions at the university, despite its claim that it does not use rankings in its management.
46	Universidade Empreendedora: Proposição de Modelo Teórico	RUIZ & MARTENS (2019)	Brazil	Development in Question, v. 17, n. 48, p. 121-138	To propose a theoretical model that characterizes entrepreneurial universities, identifying the elements that distinguish them from traditional universities.	Systematic review of literature (articles up to 2017).	Dimensions identified and organized by the study: <ul style="list-style-type: none"> • Management: Entrepreneurial organizational culture. Participatory and professionalized leadership. Curriculum and program renewal. • Infrastructure: Technology transfer offices. Community service centers. Technology parks and incubators. • Internationalization: Exchange programs.

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							<p>Encouragement of international publication.</p> <ul style="list-style-type: none"> • Financial capital: Budgetary autonomy. Fundraising. • Academic Community: Entrepreneurial education. Teacher training. Recognition and awards. • Entrepreneurial ecosystem and partnerships: Partnerships with government, companies, and other educational institutions. Active participation in innovation networks. • Third Mission: Integration between teaching, research, extension, and innovation. Generation of public value for society.
47	Análise das características empreendedoras de três universidades públicas de Minas Gerais – Brasil	SILVA <i>et al.</i> (2021)	Brazil	Organizations in Context, v. 17, n. 34, p. 59-93	To analyze the entrepreneurial characteristics of three Brazilian public universities in Minas Gerais highlighted in national rankings (RUE and RUF, both from 2019).	Comparative case study. Analysis based on a theoretical model with three categories: technical support (entrepreneurial courses and training); physical structure (incubators, laboratories, technology parks); and specialized support (mentoring, events, consulting).	The three universities have in common: robust structures to support entrepreneurship; they offer curricular and extracurricular entrepreneurial subjects; they hold events, competitions, and ideation and pre-acceleration programs; they maintain incubators and technology parks with regional impact. Among the difficulties observed are: lack of institutionalization of entrepreneurial actions; concentration of initiatives in specific departments; bureaucratic and cultural barriers to greater university-business integration; difficulty in student engagement due to the traditional curriculum load.
48	The scenarios of entrepreneurial university in 2030: A case study of Thai private universities	SIRITEERAWASU & NIRAMITCHAINO NT (2022)	Thailand, United States, Canada, Estonia, Sweden,	Kasetsart Journal of Social Sciences, v. 43, n. 1, p. 194–200	To study the practices of entrepreneurial universities in America, Europe, and Asia; to investigate the characteristics of entrepreneurial	Interviews and Delphi questionnaires with 45 experts from Thai private universities. Study of 9 prominent entrepreneurial universities:	They identified 41 characteristics of entrepreneurial universities and divided them into 5 aspects: <ul style="list-style-type: none"> • Entrepreneurial leadership and strategies (12 characteristics);

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			Netherlands, Singapore, and China		universities; to develop strategic scenarios and challenges for 2030, with a focus on Thai private universities.	<ul style="list-style-type: none"> America: MIT, Stanford, Waterloo Europe: EUAS, Chalmers, Twente Asia: NUS, CUHK, Tsinghua 	<ul style="list-style-type: none"> Teaching and instruction for entrepreneurial development (13); Interdependence and relational engagement (6); Internationalization (5); and Technological implementation (5).
49	Students' Perspectives on Entrepreneurship and Its Intention in India	SOAM <i>et al.</i> (2023)	India	Sustainability, v. 15, n. 13	To investigate the entrepreneurial intentions of students at agricultural universities in India, identifying motivations, barriers, necessary skills, and the role of public policies and career development centers.	Structured questionnaire with 1,797 undergraduate and graduate students from 17 Indian state agricultural universities. Analyses using chi-square test, ranking-based quotient (RBQ), and binary logistic regression (BLR).	Of the total sample: 57.3% were men; 96.8% were undergraduate students; 78% expressed interest in becoming entrepreneurs; 31.9% took short courses; 14.4% visited incubators; 43.2% participated in programs; 65.4% read success stories; 54.4% interacted with entrepreneurs. The motivations for entrepreneurship presented by the surveyed group were: personal passion, desire for independence, and the prospect of high income. Recommendations: include entrepreneurship courses in curricula from elementary school onwards; promote university-industry partnerships to improve employability; establish career development centers in all HEIs to develop professional and entrepreneurial skills.
50	The Role and Relevance of Rankings in Higher Education Policymaking	SPONSLER (2009)	United States	Institute for Higher Education Policy	To analyze the role and relevance of university rankings in the process of formulating public policies for higher education in the United States.	Literature review; interviews with representatives from government agencies, educational associations, and other organizations linked to higher education; case study of three US states (Minnesota, Indiana, and Texas) that have incorporated rankings into their institutional evaluation systems.	Use rankings as part of broader evaluation systems, never as the sole measure of institutional success. Support the collection of data relevant to public policy, especially on learning outcomes. Take advantage of the public attention that rankings receive to promote debates on educational quality and equity, redefining indicators that value inclusion and diversity.

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51	Global university rankings and the politics of knowledge	STACK (2021)	Canada	Book published by the University of Toronto Press	Analyze the impact of global university rankings on HEIs, their policies, academic practices, and social implications.	The chapters were written by academics from various countries and the methods included: literature review, interviews, case studies, <i>website</i> analysis, and educational policy analysis.	The pressure to publish in high-impact journals leads to the marginalization of local research and an increase in unethical practices (plagiarism, irrelevant publications). The dominance of large academic publishers creates an oligopoly that makes access to knowledge more expensive. Rankings affect the mental health of teachers and students, generating anxiety and feelings of inadequacy. Less prestigious institutions face pressure to conform to ranking criteria, even if this compromises their social mission.
52	Strategic Challenges of Mergers and Acquisitions in the Higher Education Sector	SULKOWSKI, SELIGA and WOZNIAK (2019)	France and Poland	Entrepreneurial Business And Economics Review, v. 7, n. 2, p. 199–215	To analyze the strategic challenges of mergers and acquisitions (M&A) between public universities, focusing on university management and academic entrepreneurship.	Comparative case studies between Université Grenoble Alpes (France) and Medical University of Łódź (Poland), two institutions that underwent university mergers.	<ul style="list-style-type: none"> • Case of Université Grenoble Alpes: merger began in 2002 and was completed in 2016. Motivated by international rankings and government support. Managed to improve its position in the rankings. • Case of the Medical University of Łódź: merger carried out in 2002. Motivated by financial need and government pressure. Cultural, organizational, and personal tensions persisted.
53	Fatores ambientais e internos, e a influência do <i>exploitation</i> e <i>exploration</i> no desempenho das universidades empreendedoras brasileiras	TORRES (2020)	Brazil	Master's thesis defended at the Regional University of Blumenau	Assess how environmental and internal factors influence <i>exploitation</i> and <i>exploration</i> practices, and to what extent these practices impact the performance of Brazilian entrepreneurial universities.	Questionnaire with 433 undergraduate students from 35 Brazilian universities, selected for convenience in the RUF. Data analysis using descriptive statistics, reliability tests (Cronbach's Alpha, AVE, CC), and Structural Equation Modeling via SmartPLS.	There is a lack of incentive for R&D and a weak university-industry connection in Brazil. Brazilian universities demonstrate low performance in technology transfer via patents, licenses, and spin-offs. Environmental factors have a greater influence on the practice of exploiting "old certainties", while internal factors have a greater influence on the practice of exploring "new possibilities." Exploration has a greater impact on the entrepreneurial performance of universities than exploitation.
54	Measuring the Social and Economic Impact	UZIEL, DA SILVA and DE ARRUDA (2024)	Brazil	Brazilian Journal of Operations and Production	Develop an algorithm to identify and classify companies founded by	Study with 2,849 former students of the Production Engineering course at	The BR-AFC algorithm is a tool for extracting a list of companies founded by former students from the Federal Revenue

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	of Universities' Entrepreneurial Activity: Introducing the BR-AFC Algorithm to Sort Alumni-Founded Companies			Management, v. 21, n. 1	alumni of Brazilian universities, with the aim of measuring the social and economic impact of university entrepreneurial activity.	UFRJ, who graduated between 1970 and February 2021. Consultation of the Brazilian Federal Revenue Service database (CNPJ and partners).	Service's large database and quantifying the economic and social influence of academic entrepreneurs. This makes it possible to calculate returns on investment in higher education, guide curriculum reform, and assess the secondary effects of university education.
55	Incentives for knowledge valorisation: a European benchmark	VAN DE BURG WAL, DIAS and CLAASSEN (2019)	European countries	Journal Of Technology Transfer, v. 44, n. 1, p. 1–20	Investigate how high-performing European universities establish incentives to promote knowledge valorization.	Use of <i>an</i> analytical framework for classifying knowledge valorization activities, based on semi-structured interviews with technology transfer professionals and research with the 48 European universities best ranked in the 2014/2015 edition of THE Ranking.	The following types of incentives were identified: 1. Revenue sharing (patents, consulting, products): moderately effective incentive. 2. Shareholding: less effective. 3. Awards and bonuses: less effective. 4. Career progression: most effective incentive. 5. Sharing of university resources: moderately effective About activities, they can be further divided and characterized: • Non-scalable activities (consulting, contracted education) have: wider percentage ranges, informal regulation, more restrictions (time, revenue cap). • Scalable activities (patents, products) have: formal regulation and more frequent payment into personal accounts.
56	The importance of academic new ventures for sustainable regional development	VEKIC <i>et al.</i> (2020)	Serbia, Hungary, Poland, and 14 countries in Southeast Europe	Amfiteatru Economic, v. 22, n. 54, p. 533–550	To investigate the role of academic enterprises in the information and communication technology sector as instruments of sustainable regional development.	Case study of the 125 academic enterprises founded by the University of Novi Sad (Serbia) and comparison with countries in Southeast Europe, Poland, and Hungary.	The creation of academic companies strengthens the regional economy and competitiveness. Startups and academic spin-offs are drivers of innovation and regional development. The University of Novi Sad exemplifies how entrepreneurial actions can generate local and national economic impact: it has founded 140 academic companies in 25 years, especially in the information and communication technology sector; it has contributed to the recognition of Novi Sad as

	Publication	Author (year)	Country	Type	Study Objective/Research Question	Method/Study Characteristics	Results/Conclusions
							"Software Valley"; high company survival rate (>60%). Malta leads the ranking of innovation and access to ICT among the European Union countries observed. European Union countries perform better in innovation compared to non-members.
57	Exploration on the Influential Factors of College Students' Innovation and Entrepreneurship Intention Based on Analytic Hierarchy Process	YANG (2024)	Mainland China	International Journal of Fuzzy System Applications, v. 13, n. 1	Investigate the factors that influence innovation and social entrepreneurship intention among college students.	AHP and fuzzy methods to build an educational assessment model in universities.	Entrepreneurial education should focus on developing personality traits and offering practical experiences. Students with internship or work experience have greater entrepreneurial intention. There was no significant difference in entrepreneurial intention between age groups or fields of study. The proposed model can be applied to entrepreneur evaluation, risk management, policy formulation, and personalized support.

APPENDIX B – Indicators commonly used, by dimension and subdimension of the PMS model

Dimension	Subdimension	EFFORT INDICATORS			OUTCOME INDICATORS	
		Input indicators (measure the number of resources spent or needed)	Execution indicators (measure the quantity executed)	Efficiency indicators (measure the relationship between services delivered and resources spent)	Efficacy indicators (measure how much of what was necessary to deliver was delivered)	Effectiveness indicators (measure the impact of actions in context, adding value for stakeholders)
Governance and Ecosystem	Structure	Existence of an entrepreneurship professor position	Existence of a structure that coordinates the entrepreneurial agenda within the institution and with other stakeholders within the local ecosystem	Process processing time	Number of instances for approval of university projects	Ability to maintain or expand administrative support for entrepreneurship without a proportional increase in costs
		Existence of an Innovation Policy, in accordance with national, state, and municipal legislation on innovation and entrepreneurship	Existence of actions that promote multidisciplinary connection, such as collaborative planning by teachers and the use of active teaching methodologies	Time spent by administrative staff on entrepreneurship activities in relation to their total duties	Number of projects developed by course or program coordinators	Mentions, awards, or rankings that highlight the university's administrative efficiency in promoting entrepreneurship
		Existence of specific regulations addressing issues raised by Law No. 13243/2016 (Legal Framework for Science, Technology, and Innovation) and Decree No. 9283/2018, which regulates it	Existence of mechanisms that encourage university participation in decision-making, such as the use of digital participation platforms, the creation of collegiate bodies, and the promotion of spaces for debate between the academic	Percentage of administrative activities related to entrepreneurship carried out by digital systems (process automation)	Percentage of students, teachers, and entrepreneurs satisfied with the speed and quality of administrative support provided	Percentage of initiatives, supported by infrastructure, that remain active or evolve into businesses after initial administrative support

Dimension	Subdimension	EFFORT INDICATORS			OUTCOME INDICATORS	
		Input indicators (measure the number of resources spent or needed)	Execution indicators (measure the quantity executed)	Efficiency indicators (measure the relationship between services delivered and resources spent)	Efficacy indicators (measure how much of what was necessary to deliver was delivered)	Effectiveness indicators (measure the impact of actions in context, adding value for stakeholders)
			community and management			
	Strategy	Presence of the entrepreneurial mission in the university's Institutional Policy	Number of academic mobility programs created for every 1,000 students at the HEI	Number of startups or spin-offs generated in relation to the number of active incubators, hubs, or innovation labs	Number of entrepreneurial programs in operation in relation to the number of programs planned in the institutional strategy	Existence of objectives related to the promotion of entrepreneurship, partnerships, intellectual property production, technology transfer, and service provision
		Definition of the entrepreneurial university archetype according to the main driver of the HEI, based on the variation of activities in its third mission portfolio: Research-Oriented Entrepreneurial University, Technical Entrepreneurial University (industry-oriented), Innovation and Services-Oriented Entrepreneurial University, or Commercial Entrepreneurial University (knowledge	Total number of departments, faculties, or centers that participated in the implementation of strategic entrepreneurial actions	Number of strategic partnerships established in relation to human resources dedicated to fundraising	Number of entrepreneurial policies and guidelines effectively implemented in relation to the number of policies provided for in the strategic plan	Existence of objectives related to knowledge transfer and the development of social commitment

Dimension	Subdimension	EFFORT INDICATORS			OUTCOME INDICATORS	
		Input indicators (measure the number of resources spent or needed)	Execution indicators (measure the quantity executed)	Efficiency indicators (measure the relationship between services delivered and resources spent)	Efficacy indicators (measure how much of what was necessary to deliver was delivered)	Effectiveness indicators (measure the impact of actions in context, adding value for stakeholders)
		commercialization-oriented)				
		Number of teachers, technicians, and managers directly involved in the development or review of the institutional entrepreneurial strategy	Number of plans, policies, guidelines, reports, and regulations developed to guide institutional entrepreneurial activity	Average number of strategic entrepreneurial actions carried out per academic unit in relation to the resources allocated per unit	Number of academic units that participated in strategic entrepreneurial actions in relation to the total number of units expected to be involved	Existence of institutional commitment to knowledge exchange with society, industry, and the public sector
	Collaborative innovation networks	Existence of a partnership, association, or agreement between the HEI and the science and technology park	Number of startups or spin-offs created from collaborative projects in the last three years	Percentage of effective use of laboratories, equipment, or spaces provided by partners in collaborative projects	Percentage of interinstitutional collaboration goals achieved	Number of awards received by university researchers in relation to the total number of networks in which the university participates
		Inclusion of business professionals and social leaders in the development and delivery of the curriculum matrix, to change cultural norms that discourage entrepreneurship and innovation	Number of institutional representations within the ecosystem	Number of collaborative projects executed in relation to the number of partner institutions involved	Percentage of network projects that were executed within the planned timeframe	Evidence of growth in technology hubs, increase in <i>startups</i> , or improvement in the competitiveness of local productive sectors as a result of networking, in relation to the number of teachers and technicians at the HEI
		Number of partnership agreements per 1,000 students with a	Number of international	Percentage of agreements or cooperation terms that	Number of companies graduated from incubation processes in	Number of technologies, products, or services developed

Dimension	Subdimension	EFFORT INDICATORS			OUTCOME INDICATORS	
		Input indicators (measure the number of resources spent or needed)	Execution indicators (measure the quantity executed)	Efficiency indicators (measure the relationship between services delivered and resources spent)	Efficacy indicators (measure how much of what was necessary to deliver was delivered)	Effectiveness indicators (measure the impact of actions in context, adding value for stakeholders)
		multiplier factor proportional to the total value of the agreements, in reais	partnerships per 1,000 students at the HEI	have resulted in deliverables such as prototypes, publications, patents, or applied solutions in the last three years	relation to the number of students	in collaborative networks that have been commercialized or adopted by companies in relation to the total number of solutions generated in the network
Tangible Enablers	Finance	Overall budget amount divided by the number of students at the HEI	Number of projects executed without resources	Revenue or external funding generated by projects in relation to institutional investment in projects	Revenue from transferred intellectual property by type of intellectual property and type of partner	Existence of bonuses or promotions associated with knowledge transfer and the exploitation of opportunities
		Scholarships and grants for students in situations of economic vulnerability	Total financial resources effectively used in entrepreneurial programs, projects, and actions	Total financial resources invested in entrepreneurship courses in relation to the number of courses offered	Revenue collected from the monetization of intellectual property	Revenue obtained in the last three years through licensing, royalties, or commercialization of scientific and technological research products
		Existence of a fund for the promotion of entrepreneurship and startups and an endowment fund	Number of entrepreneurial projects that received financial support from the university in relation to the total number of projects that	Total resources invested in entrepreneurial education in relation to the number of students trained	Net sales revenue of companies founded by students and alumni	Amount raised by entrepreneurial projects in external calls for proposals in relation to the amount invested by the university to structure these projects

Dimension	Subdimension	EFFORT INDICATORS			OUTCOME INDICATORS	
		Input indicators (measure the number of resources spent or needed)	Execution indicators (measure the quantity executed)	Efficiency indicators (measure the relationship between services delivered and resources spent)	Efficacy indicators (measure how much of what was necessary to deliver was delivered)	Effectiveness indicators (measure the impact of actions in context, adding value for stakeholders)
			applied for such support			
Technology and innovation infrastructure	Types of innovative environments existing at the university (incubators, accelerators, science and technology parks, hubs, coworking spaces)		Number of innovative habitats created or adapted for innovation and entrepreneurship	Level of use of digital technologies for university development	Number of laboratories, incubators, hubs, or collaborative spaces implemented in relation to the number of environments planned in the strategic plan	Existence of a learning environment adapted to a global audience
	Existence of a Technological Innovation Center (NIT)		Number of pieces of equipment purchased for use in entrepreneurial projects (3D printers, sensors, prototyping kits, computers)	Frequency with which the infrastructure (laboratories and innovation spaces) is used by students, researchers, and partner companies	Amount of technological equipment purchased and installed in relation to the amount provided for in the Innovation Policy	Number of spaces dedicated to applied research, prototyping, and development of innovative solutions
	Quality of classrooms, library, common areas, research and experimentation laboratories, and innovation environments		Total number of departments, courses, or centers that now have direct access to entrepreneurial infrastructure	Number of startups or spin-offs incubated in the infrastructure in relation to the number of students at the HEI	Number of entrepreneurial projects using the innovation infrastructure in relation to the total number of projects requiring infrastructure	Number of startups and spin-offs created with direct support from the innovation infrastructure in relation to the total number of university ventures
	Specialized human resources	Existence of a formal career development policy for all employees that		Number of faculty and technical staff participating in	Number of entrepreneurial projects supported in relation to the number	Number of intellectual property assets produced by faculty and technical staff

Dimension	Subdimension	EFFORT INDICATORS			OUTCOME INDICATORS	
		Input indicators (measure the number of resources spent or needed)	Execution indicators (measure the quantity executed)	Efficiency indicators (measure the relationship between services delivered and resources spent)	Efficacy indicators (measure how much of what was necessary to deliver was delivered)	Effectiveness indicators (measure the impact of actions in context, adding value for stakeholders)
		addresses the entrepreneurial agenda	Technical Cooperation Agreements	of employees (faculty and technical staff) involved		technical staff and faculty
		Use of entrepreneurial skills, behavior, and experience as recruitment criteria	Number of faculty and technical staff participating in incubation and pre-incubation processes	Number of participants trained in entrepreneurship in relation to the number of staff involved in training	Number of faculty members with production linked to entrepreneurship (patents, <i>startups</i> , projects) in relation to the total number of faculty members with a profile for entrepreneurial activity	Existence of entrepreneurship indicators in performance evaluation processes
		Faculty with experience in the labor market	Number of specific international recruitment initiatives in relation to the number of students at the HEI	Number of entrepreneurial projects carried out in relation to the total number of hours worked by employees	Number of staff trained in entrepreneurship in relation to the established training goal	Existence of a system of rewards, recognition, and awards for faculty and technical staff engaged in innovative initiatives
Entrepreneurial Training and Experience	Teaching and practice of entrepreneurship	Existence of specific programs on entrepreneurship	Number of curriculum components that use active teaching-learning methodologies, such as games, flipped classrooms, design thinking, and project-based learning	Number of entrepreneurship classes or subjects taught in relation to the number of teachers involved	Percentage of shared/joint degrees in relation to the number of students at the HEI	Number of graduates employed in innovation and entrepreneurship sectors in relation to the total number of graduates from courses with an entrepreneurial focus

Dimension	Subdimension	EFFORT INDICATORS			OUTCOME INDICATORS	
		Input indicators (measure the number of resources spent or needed)	Execution indicators (measure the quantity executed)	Efficiency indicators (measure the relationship between services delivered and resources spent)	Efficacy indicators (measure how much of what was necessary to deliver was delivered)	Effectiveness indicators (measure the impact of actions in context, adding value for stakeholders)
		Existence of training and consulting on industrial property	Number of subjects that incorporate digital skills and abilities into the curriculum and learning outcomes	Number of students served in entrepreneurial subjects or programs in relation to the number of subjects or classes offered	Number of courses that use active methodologies in relation to the number of courses planned to apply these methodologies	Number of graduates who say they apply entrepreneurial skills in their professional activities in relation to the total number of graduates interviewed
		Number of handouts, books, videos, digital platforms, and other pedagogical resources used focused on entrepreneurial education	Number of courses on intellectual property, innovation, and entrepreneurship	Number of teaching materials or resources used effectively in the classroom in relation to the total number of teaching materials or resources produced or acquired	Number of courses focused on entrepreneurship effectively offered in relation to the total number of courses planned in the curriculum	Number of companies or startups created by graduates who participated in entrepreneurial education programs in relation to the total number of graduates from these programs
		Existence of guidance and connection with the entrepreneurial ecosystem through mentoring provided by the university and through access to incubators	Number of extracurricular subjects offered (lectures, round tables, seminars, business idea competitions, hackathons, boot camps, summer courses)	Percentage of hours spent on extracurricular activities in relation to the total workload	Number of incubated companies per 1,000 students at the HEI	Number of mentoring sessions held in relation to the number of mentors involved
		Number of physical spaces (laboratories, coworking spaces, innovation rooms) and equipment available	Number of subjects that have contact with innovative habitats	Number of entrepreneurial projects or actions carried out in relation to the number of	Number of mentoring or entrepreneurial guidance sessions held in relation to the	Number of awards, certifications, or honorable mentions won by entrepreneurial projects in relation to

Dimension	Subdimension	EFFORT INDICATORS			OUTCOME INDICATORS	
		Input indicators (measure the number of resources spent or needed)	Execution indicators (measure the quantity executed)	Efficiency indicators (measure the relationship between services delivered and resources spent)	Efficacy indicators (measure how much of what was necessary to deliver was delivered)	Effectiveness indicators (measure the impact of actions in context, adding value for stakeholders)
		for use in practical activities		teachers and technicians involved	number of sessions planned	the total number of projects submitted for external evaluation
		Number of technical inputs available for entrepreneurial practices (prototyping kits, software, licenses, and other materials)	Number of organizations and student movements in relation to the number of students at the HEI	Number of projects that used innovation spaces and equipment in relation to total available resources	Number of practical events held (fairs, challenges, workshops) in relation to the number of events planned	Number of entrepreneurial projects with measurable social impact (examples: inclusion, sustainability, improvement of public services such as health and public education) in relation to the total number of entrepreneurial projects developed
	Scientific and technological research	Number of researchers involved in projects with potential for innovation and commercialization	Number of applied research projects developed per 1,000 students at the HEI	Percentage of research projects that have resulted in spin-offs, startups, or technology licensing in the last three years	Number of articles in international partnerships in relation to scientific production for every 1,000 students at the HEI	Impact of scientific production in online environments
		Number of internal calls for proposals focused on research with potential economic and social impact	Number of technologies developed with market potential	Number of research projects that resulted in products, processes, or services with market potential, in relation to the total number of projects funded	Percentage of publications produced in cooperation with regional organizations and industrial partners	Number of awards received by university researchers

Dimension	Subdimension	EFFORT INDICATORS			OUTCOME INDICATORS	
		Input indicators (measure the number of resources spent or needed)	Execution indicators (measure the quantity executed)	Efficiency indicators (measure the relationship between services delivered and resources spent)	Efficacy indicators (measure how much of what was necessary to deliver was delivered)	Effectiveness indicators (measure the impact of actions in context, adding value for stakeholders)
		Number of laboratories equipped for applied research and technological development	Number of scientific articles focusing on innovation or entrepreneurship	Average time required for applied research to reach a level of technological maturity (e.g., TRL – Technology Readiness Level) sufficient for commercialization	Volume of scientific production per 1,000 students at the HEI	Percentage of technologies developed that have been replicated in different contexts or regions, maintaining their effectiveness and impact
	Extension	Number of faculty members involved in extension activities focused on entrepreneurship	Number of extension activities (programs, projects, courses, events) carried out with innovative environments	Number of entrepreneurial extension projects carried out in relation to the number of employees (faculty and technical staff) involved	Percentage of actions carried out within the timeframe set out in the project work plans	Number of participants who remain involved in entrepreneurial activities after the end of the extension projects
		Number of calls for proposals launched to promote university extension focused on entrepreneurship	Number of actions for public communication of science in collaboration with other HEIs and public institutions, through writing articles for newspapers, interviews for online media, TV programs, podcasts	Number of students participating in entrepreneurial extension projects in relation to the number of projects carried out	Percentage of projects that generated continuity or developments	Percentage of projects that remain active and continue to generate impact after the end of institutional support
		Number of partnerships with external organizations to carry out	Number of hours of entrepreneurial extension activities carried out in relation	Number of partnerships established for entrepreneurial	Percentage of entrepreneurial extension projects	Number of contributions to public policies

Dimension	Subdimension	EFFORT INDICATORS			OUTCOME INDICATORS	
		Input indicators (measure the number of resources spent or needed)	Execution indicators (measure the quantity executed)	Efficiency indicators (measure the relationship between services delivered and resources spent)	Efficacy indicators (measure how much of what was necessary to deliver was delivered)	Effectiveness indicators (measure the impact of actions in context, adding value for stakeholders)
		entrepreneurial extension projects	to the number of students at the HEI	extension projects in relation to the number of proposals submitted or human resources dedicated to fundraising	completed according to the strategic plan	
	Students and alumni	Number of places in university incubators and accelerators for students and graduates (alumni)	Number of students participating in Technical Cooperation Agreements and incubation and pre-incubation processes	Number of graduates who have created entrepreneurial businesses or work in innovation ecosystems in relation to the total number of graduates who participated in entrepreneurial programs	Graduation rate	Employability rate
		Number of entrepreneurial initiation scholarships, assistance for participation in events, or project support granted to students and graduates (alumni)	Number of international exchanges carried out by the HEI, covering both HEI students going abroad and foreign students coming to the HEI, divided by the number of HEI students	Number of students participating in entrepreneurship programs in relation to the number of students with the profile or eligibility to participate	Retention rate	Proportion of international students
		Resources allocated to maintain networks of entrepreneurial alumni (examples: platforms,	Number of student society initiatives focused on	Number of students and alumni who used innovation spaces and equipment in relation	Academic performance index of students	Impact of former students on environmental sustainability, as

Dimension	Subdimension	EFFORT INDICATORS			OUTCOME INDICATORS	
		Input indicators (measure the number of resources spent or needed)	Execution indicators (measure the quantity executed)	Efficiency indicators (measure the relationship between services delivered and resources spent)	Efficacy indicators (measure how much of what was necessary to deliver was delivered)	Effectiveness indicators (measure the impact of actions in context, adding value for stakeholders)
		events, networking groups)	environmental sustainability	to the total number of expected users or available resources		professionals in environmental, water, forestry, and related engineering fields and/or in leadership positions in companies
Impact	Social impact	Existence of active prospecting for problems and/or opportunities in companies, the public sector, or society	Number of volunteer activities carried out by the institution for the benefit of the community	Number of community partnerships in relation to the number of students, teachers, and technicians at the HEI	Student internships in the region	Number of community businesses, cooperatives, or startups created or strengthened with the support of outreach activities
		Ways of prospecting problems/opportunities in the immediate environment: events at the administrative unit, academic unit, or science and technology park; NIT events; researchers' initiatives; response to public notices; events at the Brazilian Industrial Research and Innovation Company (EMBRAPII)	Number of communities served by entrepreneurial extension projects	Number of social entrepreneurs trained per unit of resources invested in training and education programs	Masters working in the region	Community satisfaction index with entrepreneurial extension projects, as a result of opinion polls with beneficiaries of the actions

Dimension	Subdimension	EFFORT INDICATORS			OUTCOME INDICATORS	
		Input indicators (measure the number of resources spent or needed)	Execution indicators (measure the quantity executed)	Efficiency indicators (measure the relationship between services delivered and resources spent)	Efficacy indicators (measure how much of what was necessary to deliver was delivered)	Effectiveness indicators (measure the impact of actions in context, adding value for stakeholders)
		Number of grants awarded for social innovation initiatives	Number of people in the community who participated in or were impacted by socially focused extension actions	Number of social impact projects carried out in relation to the number of students, teachers, and technicians at the HEI	Proportion of graduates working in the region	Evolution of social indicators in areas served by extension projects (examples: increase in schooling, improvement in health indicators, or digital inclusion)
	Economic impact	Intellectual property required in the last three years	Number of service provision projects, such as advisory services, expert reports, consulting, and specialized technical services	Average time between technology transfer and its profitability, by type of intellectual property	Absolute percentage of patents granted in the last three years	Number of patents from any source that cite research conducted by the university
		Industry co-patents in the last three years	Commercial exploitation by type of intellectual property	Percentage of academic projects that resulted in solutions with market potential	Number of technology transfers by type of intellectual property	Number of startups created in the last three years
		Number of administrative technicians assigned to the Technological Innovation Center (NIT)	Number of continuing professional development activities offered	Number of patents effectively licensed in relation to the total number of patents filed	Number of patents filed by the HEI over a ten-year period	Number of spin-offs generated in the last three years
	Environmental impact	Existence of a publicly available strategy or policy on sustainable procurement and investment	Existence of programs for water conservation and for the treatment and recycling of waste	Emissions efficiency and commitment to Net Zero, which consists of balancing greenhouse gas	Number of entrepreneurial projects that incorporate sustainable practices (examples:	Employees' perception of the university's commitment to climate change

Dimension	Subdimension	EFFORT INDICATORS			OUTCOME INDICATORS	
		Input indicators (measure the number of resources spent or needed)	Execution indicators (measure the quantity executed)	Efficiency indicators (measure the relationship between services delivered and resources spent)	Efficacy indicators (measure how much of what was necessary to deliver was delivered)	Effectiveness indicators (measure the impact of actions in context, adding value for stakeholders)
			and residues at the university	emissions with the removal of these emissions from the atmosphere, so that the number of gases emitted is equal to or less than the number of gases removed	circular economy, clean energy, waste management) in relation to the total number of entrepreneurial projects planned with this focus	
		Existence of a research center focused on environmental sustainability	Promotion of a green generation through education, research, and support activities	Number of sustainable solutions developed by teams involved in environmentally focused entrepreneurial projects	Number of startups linked to the university that have obtained environmental certifications in relation to the total number of startups that sought this recognition	Percentage of companies that have adopted sustainable technologies or practices developed in partnership with the university
		Types of renewable energy generated locally (at the point of consumption or in the region), such as solar, wind, hydro, biomass, or geothermal energy	Participation of the HEI in an officially recognized sustainable group	Number of green technologies patented per investment unit	Number of educational activities carried out with an environmental focus in relation to the number of activities planned in the strategic plan	Improvement of environmental indicators in communities served by university entrepreneurial projects (examples: water quality, air quality, or waste management)

APPENDIX C – Roadmap for conducting interviews with experts

- Do the perspectives (dimensions) derived from clustering using natural language BERT make sense to you?
- In your opinion, is there anything that needs to be adjusted in the definitions of the dimensions (subdimensions)?
- Do you think the classification of indicators according to their position in the value chain is appropriate?
- Do the indicators satisfactorily represent what each dimension (subdimension) aims to measure?
- Do you think the indicators are useful to decision-makers at HEIs?
- Do you see benefits in using the model?

ANNEXES

ANNEX A – Definitions for each internal environmental factor associated with dimensions present in entrepreneurial universities

Analytical categories (dimensions)	Subcategories (internal environmental factors)	Definitions
Academic Staff	Research/Publication	<ul style="list-style-type: none"> - Publication of scientific articles. - Existence of outstanding research at the university. - Scientific success: research output and impact.
	Academic Quality	<ul style="list-style-type: none"> - Performance in innovative and digital educational activities. - Interaction between technology transfer offices and entrepreneurship professors is vital.
	Qualification of People	<ul style="list-style-type: none"> - Increase the number of entrepreneurship professors. - Academic staff trained in academic entrepreneurship. - Universities must first educate and train their academic community. - Qualified personnel determine the commercial value of research results. - Entrepreneurship courses for academic support staff. - The recruitment of professional market trainers should also be accompanied by a professional environment at the university. - Business-trained individuals; that is, they must become experts in business planning <p>capable of positioning and shaping the entrepreneurial university as a proactive and strategically active 'company' among partner companies in the surrounding ecosystem.</p>
Entrepreneurial Culture	Entrepreneurial Attitude	<ul style="list-style-type: none"> - Favorable attitudes of the academic staff towards entrepreneurship. - Entrepreneurship is significantly related to the identification of entrepreneurial students interested in forming companies and developing inventions with commercialization potential. - Generate entrepreneurs. - Favorable attitudes of students/teachers/researchers towards entrepreneurship. - Presence of entrepreneurs at the university: promoting entrepreneurial culture.
	Entrepreneurial Education	<ul style="list-style-type: none"> - Cross-cutting educational programs that train entrepreneurial mindsets and transition skills. - Create programs that teach entrepreneurship to undergraduate students. - Entrepreneurship courses for students. - Graduate business education programs at university. - Organize entrepreneurship activities.
	Employability	<ul style="list-style-type: none"> - Generate job candidates. - Useful knowledge sought after by the market. - Facilitate interaction between students and employers.
	University Company	<ul style="list-style-type: none"> - University spin-off companies need qualified personnel. - Support for the formation of companies/ventures/spin-offs.
	Entrepreneurial Mindset	<ul style="list-style-type: none"> - In technology parks, commercialization and entrepreneurship "familiarize" students with some behaviors and concepts such as

Analytical categories (dimensions)	Subcategories (internal environmental factors)	Definitions
		<p>innovative actions, opportunism, flexibility, innovation and creativity, risk-taking, and independence.</p> <ul style="list-style-type: none"> - Emphasize entrepreneurship in the form of start-up companies in incubation. - All university functions can benefit from innovative thinking, whether it comes from administrative operations, research, teaching, service, or creating value from ideas.
	Methodology	<ul style="list-style-type: none"> - Existence of theoretical and practical teaching methodologies. - Entrepreneurial teaching methodologies. - Teaching on and off campus. - Multipurpose, theoretical, and practical knowledge, simultaneously.
Academic Management	Strategy	<ul style="list-style-type: none"> - Strategies aimed at rapid progress in knowledge and technology at the university. - Strategies to increase students' educational level, interaction with companies, and professionals' familiarity with the phenomenon of entrepreneurship. - Academic staff must be involved in the process of entrepreneurship and alignment of strategic objectives and support mechanisms: Academic staff are aware that entrepreneurial activities complement academic activities. - Identify the type of connection and technology transfer carried out by professors: some approach industry through traditional channels of interaction (publications, conferences, and consulting) and, to a lesser extent, through projects with a higher level of innovation and technological development. - University management should focus on fostering entrepreneurial activities that can be achieved by the university, rather than activities that can only be achieved by niche departments. - Decision by the Dean to open a program, define tasks, and secure funding. - Negotiations between senior administrators and private donors for programs designed to promote an entrepreneurial spirit among students, faculty, and staff. - Scholarship for transfer students from community colleges through a donation from a local entrepreneur. - The university needs planning to focus on the technological and innovation goals of the productive sector. - The university needs to identify the individual and professional characteristics of faculty, such as occupation and age, to understand their propensity to engage in projects in the public university environment.
	Governance Structure	<ul style="list-style-type: none"> - Committee of senior faculty members tasked with developing the "Vision for Innovation and Entrepreneurship", reviewing promotion and tenure policies, and recommending changes. - Greater autonomy and cooperation with the state.
	Organizational Structure	<ul style="list-style-type: none"> - Professional managers at the university: executives and managers play a role in building an infrastructure for innovation and entrepreneurship. - Flexible organizational structure to respond to changes in the environment and to work closely with the science and technology park. - Leadership capable of providing adequate support to institutional members and ensuring minimal bureaucracy and less interference, especially in research.

Analytical categories (dimensions)	Subcategories (internal environmental factors)	Definitions
	Interdisciplinarity	<ul style="list-style-type: none"> - Interdisciplinary collaboration between courses. - An interdisciplinary and interorganizational unit or Innovation Institute. - Transdisciplinary and heterogeneous structures with interdisciplinary departments/centers and hybrid bodies.
	Mission	<ul style="list-style-type: none"> - Mission must be communicated to all members of the university and explicitly mention entrepreneurship as an important task. - Social values and norms play a vital role in promoting entrepreneurial universities. - Institutional clarity in encouraging increased entrepreneurial activity in universities and its organizational and social implications.
	Incentive Policy	<ul style="list-style-type: none"> - Encourage faculty to be more inventive. - Salary and bonus system as a motivational incentive: financial support for those with new ideas. - Government plays a key role in the interaction between universities and industry. These functions include university support and funding, business marketing, laws, regulations, and government considerations. - Centrally communicate opportunities for institutional members to seek funding from external sources. - Entrepreneurial academic activities should enhance one or more of the criteria by which faculty are evaluated (research, scholarship and artistic creativity, teaching, and service). - University management needs to focus on removing existing internal barriers that are stifling the natural emergence of entrepreneurial activities by individuals. - To assist in technology transfer, the institution needs to disseminate information about research and technological development projects, collaborating with other institutions and, on the other hand, encouraging its professors. - Minimum regulations for new venture creations (university-business). - Commercialization of research to involve students as part of their studies.
	Support Network	<ul style="list-style-type: none"> - Multiple stakeholders: internal and external. - Networks, conglomerates, and strategic alliances with industry, government, and other institutions (university alliances). - Create networking and peer support mechanisms, in addition to financial support.
Diversified Income	External Fundraising	<ul style="list-style-type: none"> - External research funds/external financing from public or private funds to transform technology into innovation. - Generating income from educational activities. - Diversification of financing and revenue. - Provision of consulting services. - Income from alumni and donations. - Publication and organization of events. - Sale of university services/products. - Multiple sources of funding for research, including industry and government.
	Applied Research	<ul style="list-style-type: none"> - Publishing articles with practical implications (commercial approach to research). - University with strong applied research, which will generate income, yield economic growth for the region, and enable basic research. - Actively seek research for the university that can be commercialized: commercialization of research/knowledge.

Analytical categories (dimensions)	Subcategories (internal environmental factors)	Definitions
Support for Innovation	Support for Innovation	<ul style="list-style-type: none"> - Design creative and accelerating science and technology parks, focusing on education in commercialization, entrepreneurial intuition, and marketing for students and innovators. - Strong internal support system: university or regional support services to find the right resources and necessary skills. - Consulting for the creation of new internal and external companies such as university small business centers, research facilities, research groups or quasi-companies, liaison offices, and technology transfer offices.
	Regional Engagement	<ul style="list-style-type: none"> - Smaller-scale collaborative entrepreneurship among universities in the region. - Direct public investment in regional development strategy. - The university should contribute significantly to the regional and social development of its location. - The university should export knowledge and technology through entrepreneur-professors to solve society's socioeconomic problems. - The university is open and serves the external society through connection and collaboration with industry and the private sector. - Industrial problems posed to the university by companies seeking solutions.
	Encouraging Innovation	<ul style="list-style-type: none"> - Single public funding for an Institute of Innovation and Entrepreneurship (IIE). - Entrepreneurship support programs and business accelerators/acceleration centers to nurture new ideas.
	Infrastructure and Support	<ul style="list-style-type: none"> - University-industry collaboration is best achieved through science and technology parks, incubator services, and accelerator centers, where ideas are generated and commercialized. - Develop comprehensive, market-oriented business plans through an entrepreneurial university within science and technology parks. - Partnership with companies and government: knowledge creation/academic research hubs; technology transfer offices; incubator integrated with innovation strategy to promote start-ups. - Provide pre- and post-award administrative services to funded projects (non-economic support; physical resources). - Establish a transfer agency at the university and recruit and train staff.
	Reward System	<ul style="list-style-type: none"> - Government should have adequate reward systems in place to recognize the activities of the third mission of universities. - Universities should develop internal mechanisms to reward entrepreneurial actions.
	Knowledge and Technology Transfer	<ul style="list-style-type: none"> - Ability to negotiate and deal with industrial property rights. - Protection of intellectual property: patents, licenses, trademarks, derivations. - Institutional support: offices for integration, transfer, and licensing of technology/knowledge.

Source: adapted from Dolcimasculo (2020, pp. 63 and 108 to 116).

ANNEX B – Methodologies of the main university rankings

Methodology of the Academic Ranking of World Universities (ARWU)

Criterion	Indicator	Description	Weight
Quality of teaching	Alumni	Number of students and alumni who have won Nobel Prizes and Fields Medals (International Medal for Outstanding Discoveries in Mathematics)	10%
Quality of faculty	Award	Faculty members who have won Nobel Prizes and Fields Medals	20%
	HiCI	Number of researchers on the list of the 250 most cited in 21 areas of knowledge	20%
Research results	N&S	Authors of articles published in Nature and Science in the last 5 years	20%
	PUB	Number of articles indexed in the Science Citation Index Expanded (SCIE) and Social Science Citation Index (SSCI) databases of Web of Science from the previous year	20%
Size of the institution	PCP	Academic performance according to the size of the institution	10%

Source: adapted from EGIDA/USP (2024).

Methodology of the Webometrics Ranking of World Universities

Criterion	Indicator	Description	Weight
Visibility	Impact	Number of external links that the university domain receives from other websites	50%
Activity	Presence	Number of web pages with content published on the university domain verified by Google	20%
	Openness	Number of files available in institutional repositories (pdf, doc, docx, ppt) indexed by Google Scholar	20%
	Excellence	Number of articles among the top 10% most cited in their respective scientific fields, based on data provided by the SCImago group.	15%

Source: adapted from EGIDA/USP (2024).

Times Higher Education (THE) Global Rankings methodology vs. Latin America University Rankings

Criterion	Indicator	Description	Source of information	THE Global Weight	THE Latin America weighting
Teaching	Academic reputation	Opinion survey among academics on the prestige and reputation of higher education institutions.	Opinion survey (THE)	15%	15%
	Doctorate holders	Number of PhD holders in relation to the size of the teaching staff (proportion).	University	5.5%	5%
	Students / Academic staff	Ratio of undergraduate students admitted (enrolled) to the number of faculty members.	University	4.5%	4.5%
	Budget	Ratio between the institution's budget and the number of faculty members.	University	2.5%	6%
	Doctorates / Bachelor's degrees	Ratio between the number of doctoral degrees and bachelor's degrees awarded.	University	2%	4.5%
Research environment	Reputation in research	Opinion survey among academics on the prestige and reputation of research institutions.	Opinion survey (THE)	18%	18%
	Investment in research	Relationship between the institution's research budget and the number of faculty members.	University	5.5%	5.5%

Criterion	Indicator	Description	Source of information	THE Global Weight	THE Latin America weighting
	Publications	Ratio between the number of documents published, indexed in Scopus, and the number of faculty members.	Elsevier	5.5%	10%
Research quality	Research strength	Bibliometric index that calculates the 75th percentile of Field-Weighted Citation Impact.	Elsevier	5%	5%
	Research excellence	Bibliometric index that measures the number of publications in the top 10% of Field-Weighted Citation Impact, normalized by the number of faculty members at the institution and by field of knowledge.	Elsevier	5%	7.5%
	Research influence	Bibliometric index that measures the influence of the institution's publications, considering not only the number of citations, but also the importance of the articles that cited them.	Elsevier	5%	7.5%
	Citations	Number of citations received by publications indexed in Scopus in the last 5 years.	Elsevier	15%	0%
International perspective	Foreign and domestic students	Proportion of foreign students in relation to the number of domestic students at the institution.	University	2.5%	2.5%
	Foreign and national faculty	Proportion of foreign faculty members in relation to the number of national faculty members at the institution.	University	2.5%	2.5%
	International collaboration	Number of articles produced with one or more foreign co-authors in the last 5 years.	Elsevier	2.5%	2.5%
Industry	Funding from industry	Measures the weight of resources allocated to research and originating from industry in relation to the number of faculty members.	University	2%	2%
	Patents	Number of citations of the institution's research in patent applications indexed in Scopus.	Elsevier	2%	2%

Source: adapted from EGIDA/USP (2024).

Methodology of the Performance Ranking of Scientific Papers for World Universities (NTU Rankings)

Criterion	Indicator	Description	Source of information	Weight
Productivity	Articles published in ESI	Number of articles published in the last 11 years and indexed in Essential Science Indicators	Clarivate	10%
	Articles indexed in SCI and SSCI	Number of articles from the current year indexed in the Science Citation Index and Social Science Citation Index	Clarivate	15%
Impact	Citations received in ESI	Number of citations received in the last 11 years in Essential Science Indicators	Clarivate	15%
	Citations received in SCI and SSCI	Number of citations received in the last 2 years in the Science Citation Index and Social Science Citation Index	Clarivate	10%
	Average number of citations received	Average number of citations received in the last 11 years in Essential Science Indicators	Clarivate	10%

Criterion	Indicator	Description	Source of information	Weight
Research excellence	H index (SCI and SSCI)	H-index for the last 2 years in the Science Citation Index and Social Science Citation Index	Clarivate	10%
	HiCI	Number of highly cited articles in the last 11 years in Essential Science Indicators	Clarivate	15%
	Publication in high-impact journals	Number of articles in the current year in high-impact scientific journals. Top 5% in each field according to Journal Citation Reports	Clarivate	15%

Source: adapted from EGIDA/USP (2024).

Leiden Ranking Methodology (CTWS)

Criterion	Indicator	Description	Source of information
Publications	Publications	Total number of publications in Web of Science	Clarivate
Impact	MCS	Average number of citations of the university's publications	Clarivate
	Normalized average number of citations	Average number of citations of university publications normalized by Web of Science scientific field, year of publication, and document type	Clarivate
	Top 10%	Proportion of university publications compared to similar publications among the top 10% most cited	Clarivate
	PPcollab	Proportion of articles that the university published in collaboration with one or more institutions.	Clarivate
	PPintcollab	Proportion of the university's works published in collaboration with one or more countries.	Clarivate
Institutional collaboration	PPUcollab	Proportion of publications in collaboration with companies or institutions belonging to the private sector.	Clarivate
	PP < 100km	Proportion of publications in collaboration with a geographical distance of less than 100km.	Clarivate
	PP > 5000km	Proportion of publications in collaboration with a geographical distance greater than 5000km.	Clarivate

Source: adapted from EGIDA/USP (2024).

Best Global Universities Rankings Methodology

Criterion / Indicator	Weight
Global research reputation	12.5%
Regional research reputation	12.5%
Publications	10%
Books	2.5%
Conferences	2.5%
Normalized citation impact	10%
Total citations	7.5%
Number of publications among the top 10% most cited	12.5%
International collaboration – in relation to the country	5%
International collaboration	5%
Number of highly cited articles that are among the top 1% most cited in their respective fields	5%

Criterion / Indicator	Weight
Percentage of total publications that are among the top 1% most cited articles	5%

Source: adapted from EGIDA/USP (2024).

SCImago Institutions Rankings (SIR) methodology

Criterion	Weight	Indicator	Description	Weight
Research	50	NI	Normalized impact	13%
		EwL	Excellence with Leadership	8%
		O	Production	8%
		L	Scientific leadership	5%
		NotOJ	Non-periodicals Own	3%
		OJ	Own Periodicals	3%
		Exc	Excellence	2%
		Q1	High-Quality Publications	2%
		IC	International Collaboration	2%
		OA	Open Access	2%
Innovation	30%	STP	Scientific Talent Pool	2%
		IK	Innovative Knowledge	10%
		PT	Patents	10%
Social	20	IT	Technological Impact	10%
		AM	Altimetry	3%
		WS	Network size	3%
		AScore	Authority Score	3%
		SDG	Sustainable Development Goals	5%
		FemSTP	Female Scientific Talent Pool	3%
OV	Impact on public policy	3%		

Source: adapted from EGIDA/USP (2024).

Quacquarelli Symonds (QS) World University Rankings methodology vs. Latin America & The Caribbean Rankings

Criterion	Indicator	Description	Source of information	QS Global Weight	QS Latin America and Caribbean Weight
Reputation	Academic Reputation	Points obtained by institutions in the global "Peer Review" survey of academic peers' opinions.	Opinion survey (QS)	30%	30%
	Reputation among employers	Points obtained by institutions in the opinion survey conducted among employers.	Opinion survey (QS)	15%	20%
Quality of teaching	Faculty with Doctorates	Proportion of faculty with PhDs in relation to the total number of faculty at the institution.	Universities, Ministries, and National Agencies	Not applicable.	10%
	Students per faculty member	Proportion of the number of students per faculty member at the institution.	University, Ministries, and National Agencies	10%%	10
Research impact	Publications per faculty member	Ratio between the total number of publications from the institution	University and Elsevier (Scopus)	Not applicable.	5%

Criterion	Indicator	Description	Source of information	QS Global Weight	QS Latin America and Caribbean Weight
		indexed in Scopus and the number of faculty members.			
	Citations per faculty member	Total citations received by the institution for publications indexed in the Scopus database over the last 5 years divided by the number of faculty members at the institution.	Elsevier (Scopus)	20%	10%
International orientation	Foreign faculty	Proportion of foreign faculty members in the institution's teaching staff.	Universities, Ministries, and National Agencies	5%	Not applicable.
	Foreign students	Proportion of foreign students enrolled at the institution.	Universities, Ministries, and National Agencies	5%	Not applicable.
Academic collaboration	International research network	Geographic diversification of sustainable research partnerships.	Elsevier (Scopus)	5%	10%
Alumni	Impact of graduates	Employability of graduates and their impact on society.	University and external sources (awards, magazines etc.)	5%	Not applicable.
Education for sustainability	Sustainability	Adherence of the activities developed by the University (teaching, research, extension, and management) to sustainable practices.	University and Elsevier (Scopus)	5%	Not applicable.
Impact on the Web	Web impact	Effectiveness with which institutions make use of new technologies, especially <i>online</i> .	Webometrics	Not applicable.	5%

Source: adapted from EGIDA/USP (2024).

Quacquarelli Symonds (QS) Sustainability Rankings Methodology

Criterion	Indicator	Description	Weight
Social Impact	Equality	EQ1 - Impact of Research on SDGs for Equality	4%
		EQ2 - Gender Proportion of Students	1%
		EQ3 - Gender Ratio of Faculty Members	1%
		EQ4 - Proportion of Women in Leadership Positions	1%
		EQ5 - Equality, Diversity, and Inclusion Policy	1%
		EQ6 - Academic Equality (Employee Perspective)	2%
		EQ7 - Support for People with Disabilities	1%
		EQ8 - National Equality Statistics	1%
	Knowledge Exchange	KE1 - Knowledge Exchange: Progress/Dissemination	6%
		KE2 - Outreach and Community Engagement	1%
		KE3 - Employee Perception	2%
		KE4 - Citations of (Social) Policies	1%
	Impact of Education	IE1 - Impact of Research on SDGs for Education	3%
		IE2 - Academic Reputation for Impact on Education	1%
		IE3 - Impact of Alumni on Education	1%

Criterion	Indicator	Description	Weight
		IE4 - Academic Freedom Index	1%
		IE5 - National Statistics on the Impact of Education	1%
	Employability and Opportunities	EO1 - Employer Reputation	2%
		EO2 - Impact of Research on SDGs for Employment and Opportunities	4%
		EO3 - Work Readiness (Graduates' Perspective)	1%
		EO4 - National Statistics on Employment and Opportunities	1%
		EO5 - Industry Partnerships	2%
		EO6 - Satisfaction with Skills	1%
	Health and Well-being	HW1 - Impact of Research on SDGs for Health and Well-being	3%
		HW2 - Health Provision on Campus	1%
HW3 - National Health and Wellness Statistics		1%	
Environmental Impact	Environmental Sustainability	ES1 - Impact of Alumni on Innovation	5%
		ES2 - Member of an Officially Recognized Sustainable Group	1%
		ES3 - Commitment to Climate Change (Employee Perception)	2%
		ES4 - Publicly Available Strategy or Policy on Sustainable Procurement and Investment	1%
		ES5 - Student Society Focused on Environmental Sustainability	1%
		ES6 - Commitment to Net Zero	1%
		ES7 - Emissions Efficiency	1%
		ES8 - Renewable Energy Generated On-Site	1%
		ES9 - Progress Toward Target	1%
		ES10 - Climate Strategy Policy	1%
	Environmental Education	EE1 - Academic Reputation in Land and Environment	10%
		EE2 - Impact of Alumni on Environmental Sustainability - Public Sector and Third Sector	4%
		EE3 - Climate Science and/or Sustainability Courses	3%
	Environmental Research	ER1 - Impact of Research on SDGs for Sustainable Research	9%
		ER2 - National Statistics on Sustainable Research	1%
		ER3 - Research Center Focused on Environmental Sustainability	2%
ER4 - Citations of (Environmental) Policies		1%	
Governance	Good Governance	GG1 - Ethical Culture	1%
		GG2 - Open Access Publication	1%
		GG3 - Dedicated Team for Sustainable Development	1%
		GG4 - Transparent Financial Reporting	1%
		GG5 - Student Union	1%
		GG6 - Student Representation in Governance	1%
		GG7 - Published Governance Minutes	1%
		GG8 - National Signatory of the UN Charter Against Torture	1%
		GG9 - Employee Perception	1%
		GG10 - Policy Citations (Governance)	1%

Source: adapted from EGIDA/USP (2024).

Methodology of Universitas Indonesia (UI) GreenMetric World University Ranking

Criterion	Indicator	Description	Weight
Land use and infrastructure	SI	Various arrangements for construction and university environment towards a green environment.	15%

Criterion	Indicator	Description	Weight
Energy and climate change	CE	University focuses on energy use, alternative energy, and climate change issues.	21%
Waste	WS	Treatment and recycling of waste and residues at the university.	18%
Water	WR	University program to conserve water use.	10%
Transport	TR	University programs for eco-friendly transportation.	18%
Current Scientific Productivity Education	DE	The role of universities in promoting a green generation through education, research, and support activities.	18%

Source: adapted from EGIDA/USP (2024).

Methodology of the University Ranking by Academic Performance (URAP) - Global coverage, reference year: 2023

Indicator and (Weight)	Objective	Coverage	Description	Source of information
Article (21%)	Current Scientific Productivity	2022	Measure of current scientific productivity that includes articles published in journals listed within the first, second, and third quartiles in terms of Journal Impact Factor.	InCites
Citation (21%)	Research Impact	2018-2022	Research impact measure scored according to the total number of citations received between 2018-2022 for all documents published in journals between 2018-2022.	InCites
Total Documents (10%)	Scientific Productivity	2018-2022	Measure of sustainability and continuity of scientific productivity, presented by the total number of documents covering all academic production of institutions, including conference articles, reviews, letters, discussions, scripts, and journal articles published between 2018-2022.	InCites
Total Article Impact (18%)	Research Quality	2018-2022	Measure of scientific productivity adjusted by the institution's normalized CPP in relation to the global CPP in 24 subject areas between 2018-2022. The ratio of the institution's CPP to the global CPP indicates whether the institution is performing above or below the global average in that field. This ratio is multiplied by the number of publications in that field and then added across the 24 fields.	InCites
Total Citation Impact (15%)	Research Quality	2018-2022	Measure of research impact corrected by the institution's normalized CPP in relation to the global CPP in 24 subject areas between 2018-2022. The ratio of the institution's CPP to the global CPP indicates whether the institution is performing above or below the global average in that field. This ratio is multiplied by the number of citations in that field and then summed across the 24 fields.	InCites
International collaboration (15%)	International acceptance	2018-2022	Measure of a university's global acceptance. International collaboration data, which is based on the total number of articles published in collaboration with foreign universities between 2018-2022.	InCites

Source: URAP (2025).

Round University Ranking (RUR) Methodology

Axis	Indicators	Weight
Teaching (40%)	Teachers per students	8%
	Teachers per number of bachelor's degrees awarded	8%
	Number of doctoral degrees awarded by teachers	8%
	Number of doctoral degrees awarded per number of bachelor's degrees awarded	8%
	International reputation for teaching	8%
Research (40%)	Citations per number of academics and researchers	8%
	Number of doctoral degrees by number of admissions to doctoral programs	8%
	Normalized citation impact – university citations per average publication worldwide	8%
	Scientific publications per number of academics and researchers	8%
	International reputation of research	8%
International diversity (10%)	Percentage of international professors	2%
	Percentage of international students	2%
	Percentage of publications with international co-authors	2%
	Reputation outside the university's region	2%
	International level	2%
Financial sustainability (10%)	Institutional income per faculty member	2%
	Institutional income per student	2%
	Publications per research income	2%
	Research income per faculty and researchers	2%
	Research income by institutional income	2%

Source: adapted from Dolcimasculo (2020).

U-Multirank methodology

Dimensions	Indicator	Source of information
Teaching and learning	Bachelor's degree completion rate	Questionnaire answered by the HEI
	Master's degree completion rate	Questionnaire answered by the HEI
	Graduation within expected time (bachelor's degree)	Questionnaire answered by the HEI
	Graduation within expected time frame (master's degree)	Questionnaire answered by the HEI
Research	Most cited publications	Independent sources, such as Web of Science
	Citation rate	Independent sources, such as Web of Science
	Academic publications (absolute number)	Independent sources, such as Web of Science
	Publications (normalized size)	Independent sources, such as Web of Science
	Interdisciplinary publications	Independent sources, such as Web of Science
	Open access publications	Independent sources, such as Web of Science
	External research revenue	Questionnaire answered by the HEI
	Art-related products	Questionnaire answered by the HEI
	Strategic research partnerships	Questionnaire answered by the HEI
	Postdoctoral positions	Questionnaire answered by the HEI
Knowledge transfer	Income from private sources	Questionnaire answered by the HEI

Dimensions	Indicator	Source of information
	Publication co-authored with industrial partners	Independent sources, such as Web of Science
	Patents granted (standardized size)	Independent sources, such as Web of Science
	Patents granted (absolute numbers)	Independent sources, such as Web of Science
	Patents co-authored with industry	Independent sources, such as Web of Science
	Spin-offs	Questionnaire answered by the HEI
	Publications cited in patents	Independent sources, such as Web of Science
	Income obtained from continuing professional development	Questionnaire answered by the HEI
	Companies created by graduates	Questionnaire answered by the HEI
Internationalization	Bachelor's degree programs in foreign languages	Questionnaire answered by HEI
	Master's programs in foreign languages	Questionnaire answered by the HEI
	Student mobility	Questionnaire answered by the HEI
	International academic staff	Questionnaire answered by the HEI
	Percentage of foreign PhD graduates	Questionnaire answered by the HEI
	Joint international publications	Independent sources, such as Web of Science
Regional engagement	Graduates working in the region	Questionnaire answered by the HEI
	Student internships in the region	Questionnaire answered by the HEI
	Joint regional publications	Independent sources, such as Web of Science
	Income from regional sources	Questionnaire answered by the HEI
	Master's degree graduates working in the region	Questionnaire answered by the HEI
	Regional publications with industrial partners	Independent sources, such as Web of Science

Source: adapted from Prado (2023, pp. 13 and 14).

Methodology of the Center for World University Rankings (CWUR)

Indicators		Weight
Quality of education		15%
Employment of alumni		15%
Quality of teachers		15%
Search performance:	Search result	10%
	Publication quality	10%
	Influence	10%
	Citations	10%

Source: adapted from Dolcimasculo (2020).

Folha University Ranking (RUF) Methodology

Dimension	Indicator	Description	Source of information	Weight
Research	Total publications	Absolute number of scientific articles published by the university in the last 5 years in journals indexed in Web of Science.	Clarivate	7%
	Total citations	Measures the relevance of scientific works produced at the university in the last 5 years in journals indexed in Web of Science based on the total number of citations that the works received in the current year.	Clarivate	7%

Dimension	Indicator	Description	Source of information	Weight
	Citation per publication	Average number of citations in the current year for each scientific article published by the university in the last 5 years.	Clarivate	4%
	Publications per faculty member	Average number of scientific articles published by each university professor in the last 5 years.	Clarivate	7%
	Citations per faculty member	Average number of citations each professor at the university has received in the current year.	Clarivate	7%
	Publications in national journals	Number of scientific articles published in Brazilian journals in the last 5 years.	SciELO	3%
	Funding received per institution	Average amount of financial resources obtained by faculty members in the current year from state and federal science funding agencies.	Funding agencies	3%
	CNPq productivity fellows	Percentage of university professors considered especially productive by CNPq (productivity grant).	CNPq	2%
	Theses	Number of theses defended in the current year by number of professors.	CAPES	2%
Teaching	Faculty with master's and doctoral degrees	Percentage of faculty members at the institution with master's and doctoral degrees.	CAPES	4%
	Full-time and part-time teachers	Percentage of faculty members working full-time or part-time.	CAPES	4%
	Enade score	University average score on the National Student Performance Exam for the last three editions.	Enade	4%
	Opinion of Higher Education Teachers	University average in the last three surveys conducted by Datafolha with teachers across the country.	Datafolha (research institute of the Folha Group)	20%
Market	Market	University average in the last three surveys conducted by Datafolha to gather the opinions of more than 5,000 human resources professionals.	Datafolha (research institute of the Folha Group)	18%
Internationalization	International citations per faculty member	Average number of international citations received in the current year for the work of university faculty members.	Clarivate	2%
	International co-authored publications	Percentage of publications in the last 5 years in partnership with foreign researchers in relation to the institution's total publications (Web of Science).	Clarivate	2%
Innovation	Patents	Number of patents applied for by the university in the last 10 years.	INPI	2%
	Partnerships with companies	Number of studies published by the university in partnership with the productive sector in the last 5 years in Web of Science journals.	Clarivate	2%

Source: adapted from EGIDA/USP (2024).

General Course Index (IGC) Methodology

The IGC is calculated annually, assigning scores from 1 (one) to 5 (five), considering the following aspects (INEP, 2020b):

- Average of the Preliminary Course Concepts (CPCs) for the last three years (the year of calculation and the two previous years), weighted by the number of enrollments in each of the courses calculated;
- Average of the scores assigned by CAPES in the last triennial evaluation available for stricto sensu graduate programs, converted to a compatible scale and weighted by the number of enrollments in each of the corresponding graduate programs, according to official CAPES data; and
- Distribution of students among the different levels of education, undergraduate or stricto sensu graduate, excluding the information in the previous item for institutions that do not offer stricto sensu graduate programs.

It should be noted that the CPC assesses the quality of undergraduate courses in Brazil and is calculated “based on the assessment of student performance, the added value of the educational process, and inputs related to the conditions of supply, according to the methodology approved by the National Commission for the Evaluation of Higher Education (Conaes)” (INEP, 2020a).

Global University Visibility Rankings (GUV) Methodology

Indicator	Description
News mentions	This is the most weighted factor in the calculation. It represents the level of visibility that a university has based on the number of news mentions in the last 12 months; how many times the university is mentioned in traditional news over a one-year period. It consists mainly of national and international newspapers, print and online newspapers, television and radio broadcasts, news agencies, and blogs.
Public interest	This is the second most weighted factor in calculation. It assesses public interest in the university based on the number of people who search for information about the university on major search engines (e.g., Google) in a month. It requires action on the part of the individual to actively seek information about the university.
Social media	Total combined number of followers on the university's official Instagram, Facebook, Twitter (X), and LinkedIn channels. This demonstrates not only reach, but also the action taken to follow the university's channels. TikTok is not included, as many universities do not have a presence on the platform.
Website visits	Reflects the approximate number of people who spent time visiting the university's website in a given month.
Web references (also called citations)	This information is based on the number of unique online links to the university's website. This indicator is based on the algorithm first popularized by Google's PageRank.
Online footprint	The university's digital footprint reveals the amount of publicly visible and freely accessible online information related to the university.
Video views	Total combined number of views on the university's official channel. YouTube is the second most visited website in the world, as well as the second largest search engine. YouTube reaches all age groups and continues to grow.

Source: American Caldwell (2025).

College Guide Methodology

Evaluators grade each course from 1 (one) to 5 (five) for quality: pedagogical design (characteristics of the course's teaching proposal), faculty (profile of professors associated with the course), and infrastructure (conditions of materials and equipment offered). The highest and lowest scores received by each course are discarded. The final numerical result for the course is the average of the remaining intermediate scores. The numerical result is converted into stars according to the following quality concepts: five stars (excellent); four stars (very good); three stars (good) and no stars (Estadão, 2024).

ANNEX C – HEInnovate statements and examples of good practice

Statement	Examples of good practices
<p>Entrepreneurship and innovation are an important part of the HEI's strategy.</p>	<ul style="list-style-type: none"> • Have a written mission statement and strategy, defining an entrepreneurial and innovative vision for the future of the institution. • Have a strategy and vision that clearly emphasizes the importance of entrepreneurship and innovation, culturally, socially, environmentally, and economically. • Articulate a clear implementation plan to achieve your strategy and vision with clear objectives and key performance indicators. • Provide a strategic roadmap presented in a simple format that is widely communicated and applied throughout the HEI. • Articulate how the strategy is regularly reviewed to keep it up to date and relevant, aligned with entrepreneurial and innovative ambitions.
<p>The HEI leadership demonstrates an entrepreneurial attitude and competencies that drive institutional change.</p>	<ul style="list-style-type: none"> • Ensure that there are dedicated people in leadership positions to implement the entrepreneurial and innovation vision and strategy, who have the necessary entrepreneurial skills and competencies. • Drive and foster the entrepreneurial agenda by involving identified entrepreneurs who are part of the ecosystem, both inside and outside the HEI. • Leadership takes ownership and responsibility for implementing the entrepreneurial agenda. • Leadership has a clear vision of how to create opportunities for entrepreneurship and innovation in all aspects of the institution and its community at large.
<p>There is a structure/system in place to coordinate and integrate entrepreneurial activities across the HEI to facilitate the implementation of the institutional entrepreneurial agenda.</p>	<ul style="list-style-type: none"> • Have a governance structure where key decision-making roles are clearly defined to support the entrepreneurial and innovation agenda. • Decision-making roles within governance structures consider existing relationships and activities that occur within the HEI, and there is associated accountability. • The governance structure supports communication, coordination, and integration of entrepreneurial and innovative activities both internally (departments, faculties, or centers) and externally with other stakeholders within the local entrepreneurship ecosystem. • There are explicit measurable goals for the entrepreneurial and innovation agenda for which the HEI is held accountable.
<p>The HEI encourages and supports faculties, departments, units, teams, and individuals to act entrepreneurially.</p>	<ul style="list-style-type: none"> • Allow faculties, departments, units, and teams within the institution to take full responsibility and ownership for the development of new structures and centers. • Ensure ownership and allocate responsibility for the development of new activities and initiatives that stimulate entrepreneurial and innovation capacity. • Support faculties, departments, units, and teams through a series of incentives and rewards linked to the demonstration of entrepreneurial and innovative results.
<p>The HEI is a driving force for entrepreneurship and innovation in regional, social, and community development, as well as addressing social challenges.</p>	<ul style="list-style-type: none"> • Be actively involved in the development and implementation of local, regional, and/or national innovation and entrepreneurship strategies. • Encourage the involvement of a wide range of actors to help address social challenges collaboratively. • Provide general access to the institution's facilities to others in the wider community. • Support <i>startups</i> and/or established businesses in the region to increase innovation and growth. • Have a strong presence in their communities, for example, by supporting local cultural and artistic activities.
<p>Entrepreneurship and innovation are supported by institutional culture and sustainable funding.</p>	<ul style="list-style-type: none"> • Ensure a close link between HEI's long-term commitment to investing in entrepreneurial and innovative activities and its financial strategy. • Interact continuously with funders and investors to secure financial resources to meet the HEI's objectives. • Seek a balanced and diversified range of funding and investment sources, including in-kind contributions. • Reinvest revenues generated by leveraging its own research, teaching, and third mission activities (self-financing). • Promote initiatives at the faculty and higher education institution levels to bring together entrepreneurs, i.e., academics, professionals, researchers, and students, and share practices to inspire the community.

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The building of new relationships and synergies is promoted by supportive institutional policies.	<ul style="list-style-type: none"> • Promote interdisciplinarity among faculties. • Provide dedicated training for effective synergies both internally and externally. • Promote shared resources between units and faculties and with external stakeholders. • Establish structures for dialogue and decision-making between staff and students. • Support teaching and research groups across faculties.
The HEI engages, recruits, and promotes individuals with entrepreneurial attitudes, behavior, and experience.	<ul style="list-style-type: none"> • Demonstrate the importance the company attaches to the inclusion of people from diverse backgrounds, for example, in its entrepreneurial strategy. • Give status and recognition to those who contribute to the institution's entrepreneurial and innovative agenda. • Recruit individuals with a solid entrepreneurial background in the private, public, or voluntary sectors and outside academia.
The HEI invests in employee training and development to support its entrepreneurial and innovative agenda.	<ul style="list-style-type: none"> • Have a formal career development and progression policy for all employees involved in implementing the institution's entrepreneurial and innovative agenda. • Define individual goals and performance indicators for all employees who support the implementation of the entrepreneurial and innovative agenda. • Measure the team's progress against these goals regularly. • Link the team's training needs to career goals that support the entrepreneurial and innovative agenda.
Rewards, incentives, and recognition for career progression are given to employees who actively support the institution's entrepreneurial and innovative agenda.	<ul style="list-style-type: none"> • Adjust the teaching and research workload of staff who take on new responsibilities that support the institution's entrepreneurial and innovative agenda. • Provide institutional funds to employees to stimulate innovation and change. • Offer sabbaticals for development to employees seeking to enhance their entrepreneurial capacity. • Encourage reward systems beyond traditional criteria of research, publications, and teaching. • Offer opportunities for faculty to work part-time in their own businesses (where permitted). • Provide office and laboratory space for employees to develop entrepreneurial and innovative activities. • Have mechanisms in place to share risks and rewards when engaging in entrepreneurial opportunities.
The HEI offers a variety of formal learning opportunities, including the use of flexible learning paths to develop entrepreneurial mindsets and skills.	<ul style="list-style-type: none"> • Offer customized entrepreneurship courses in all areas and levels of study. • Support curricular changes to stimulate and develop entrepreneurial mindsets and skills through new pedagogies, student-centered, interdisciplinary, and practice-based learning (e.g., MOOCs, living labs, use of case studies, games, and simulation). • Provide support and training to staff in creating and restructuring new curricula related to entrepreneurship and entrepreneurial education. • Provide mechanisms for students to participate in course review and feedback. • Introduce new student support mechanisms, including the experience of starting new ventures in students' formal education or offering entrepreneurial education with practicing entrepreneurs. • Ensure that all learning opportunities are designed and delivered to be inclusive and sustainable.
The HEI offers a wide range of informal learning opportunities and experiences to stimulate the development of entrepreneurial mindsets and skills.	<ul style="list-style-type: none"> • Support and reward access to student entrepreneurship clubs, awards, and societies. • Organize networking events between students and entrepreneurs/companies. • Involve and reward students in idea/business plan competitions as part of their extracurricular opportunities. • Formally recognize entrepreneurial extracurricular activities.
The HEI validates and evaluates the results and impacts of entrepreneurial learning.	<ul style="list-style-type: none"> • Codify the expected outcomes of entrepreneurial learning in terms of knowledge, skills, and competencies across all degree programs. • Ensure that students have a clear understanding of the expected and achieved entrepreneurial learning outcomes. • Validate entrepreneurial learning outcomes at the institutional level. • Assess entrepreneurial learning outcomes linked to the final grade for the subject/course.

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	<ul style="list-style-type: none"> • Recognize entrepreneurial learning outcomes in student achievement records.
<p>The HEI co-designs and delivers a curriculum with external stakeholders that responds to societal challenges.</p>	<ul style="list-style-type: none"> • Regularly review and evaluate the involvement of external stakeholders in course design and delivery. • Provide a mechanism for staff to work with external stakeholders to develop and deliver high-quality course content. • Integrate the experience and expertise of external stakeholders into the development and delivery of learning activities. • Support a diversity of collaborative partnerships with local communities and organizations, local and regional governments, chambers of commerce, industry, and alumni of higher education institutions.
<p>Research findings on entrepreneurship are integrated into teaching and learning activities.</p>	<ul style="list-style-type: none"> • Encourage staff and educators to review the latest research in entrepreneurial education. • Provide a forum where staff and educators can exchange new knowledge and ideas, incorporating the latest research. • Provide access to inspiration from other HEIs through networking and sharing of best practices. • Integrate validated research findings on entrepreneurial education into the curriculum.
<p>The HEI raises awareness of entrepreneurship and stimulates the entrepreneurial intentions of students, graduates, and staff to start a business or venture.</p>	<ul style="list-style-type: none"> • Provide favorable structural conditions for starting a business, such as allowing employees to own shares, work part-time, take sabbaticals, and allowing students to extend the duration of their study programs to support the start of a new venture while studying. • Make effective use of communication channels to raise awareness of opportunities and showcase entrepreneurship among employees and students in all areas of the institution. • Celebrate and recognize the successes of entrepreneurial students, graduates, and employees. • Provide opportunities for students to engage in research projects that lead to entrepreneurial opportunities and internships with entrepreneurs.
<p>The HEI supports its students, graduates, and staff in creating, managing, and growing a business or new venture.</p>	<ul style="list-style-type: none"> • Provide intellectual property assistance to potential startups. • Create an advisory panel of experts for early-stage concepts. • Organize interdisciplinary idea generation activities (e.g., startup weekends) and startup pitch competitions. • Offer funds to support market feasibility studies. • Offer training in entrepreneurial skills and competency development.
<p>Mentoring and other forms of personal and business project development are offered.</p>	<ul style="list-style-type: none"> • Organize visible, accessible, and high-quality mentoring and personal development activities. • Actively recruit mentors and provide them with training, resources, formal recognition, and rewards. • Facilitate the matching of mentors and mentees. • Provide feedback mechanisms on entrepreneurs' contributions. • Offer peer mentoring opportunities, such as entrepreneur clubs, where members help each other.
<p>The HEI offers or facilitates access to business incubation, acceleration, and financing.</p>	<ul style="list-style-type: none"> • Offer financial education to entrepreneurs and potential entrepreneurs so they better understand financial concepts and how to apply them. • Organize networking and funding events for aspiring entrepreneurs to present their ideas to investors and get feedback. • Offer microfinance instruments such as grants, awards, loans, and capital. • Use your network of potential investors for crowdfunding. • Closely link access to financing activities with training, mentoring, and incubation. Host your own incubators or facilitate access to external incubators. • Ensure that your incubators offer a full range of support (networking, mentoring, etc.) as well as physical infrastructure. • Promote the incubator widely on campus and organize events that engage potential entrepreneurs. • Incorporate incubation facilities into the HEI's research and education infrastructure to increase synergies.

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Global challenges are reflected in the entrepreneurial initiatives of HEIs.	<ul style="list-style-type: none"> • Promote opportunities that bring together researchers, staff, graduates, students, and society. • Support joint initiatives with the entrepreneurial ecosystem to discuss priorities and challenges and promote common solutions. • Participate in collaborative programs at the regional, national, and international levels that offer the opportunity to address global challenges.
The HEI promotes a digital culture and implements and monitors a digital strategy to support innovation and entrepreneurship.	<ul style="list-style-type: none"> • Have leadership commitment and vision for a culture built on shared values that promote digital transformation for innovation and entrepreneurship. • Develop a strategy that sets goals for how the institution will seek to innovate and improve through digital transformation. • Have an action plan and allocate sufficient resources to implement the various aspects of this strategy with clear and measurable goals. • Evaluate, monitor, and communicate the benefits and added value of digital transformation in all HEI activities for innovation and entrepreneurship.
The HEI continuously invests in, manages, and improves a digital infrastructure that supports innovation and entrepreneurship.	<ul style="list-style-type: none"> • Ensure that an operational plan is in place for the management, optimization, and continuous adaptation of information and communication technology systems and services with clear objectives and performance metrics. • Provide support and personalized access to a well-functioning infrastructure that meets the needs of staff, students, and society at large. • Implement measures to protect the privacy, confidentiality, safety, and well-being of employees and students. • Ensure that legal and ethical policies and standards specifically related to digital aspects are in place and widely understood, including regarding innovation and intellectual property rights.
The HEI actively supports the use of digital technologies to improve quality and equity in teaching, learning, and entrepreneurial assessment.	<ul style="list-style-type: none"> • Incorporate digital competencies and skills into the curriculum and intended learning outcomes across all disciplines. • Support innovation through a wide range of pedagogical approaches based on the use of digital technologies and implemented at scale. • Provide training and development opportunities for staff on the use of digital technologies for teaching, learning, and assessment. • Ensure that training and development opportunities include consideration of the use of digital technologies to support quality and equity in the educational experience. • Encourage staff and students to reflect on research, and disseminate their digital teaching, learning, and assessment practices. • Monitor and demonstrate how the experience of students and staff can be enhanced through the implementation of digital tools and practices.
The HEI actively uses open educational resources, open science, and open data practices to improve institutional performance and increase impact on its entrepreneurial ecosystem.	<ul style="list-style-type: none"> • Develop and implement a comprehensive strategy and action plan for open educational resources, open science, and open data, supported by a series of reward mechanisms. • Promote an enabling environment that supports open science, the use and development of open educational resources and open data across different disciplines, faculties, and with external stakeholders. • Provide guidelines, training, and support on open educational resources, open science, and open data practices.
The HEI makes full use of its digital capacity to promote sustainable and inclusive innovation and entrepreneurship.	<ul style="list-style-type: none"> • Use digital tools and practices to achieve a more integrated and seamless exchange of relevant information between its staff and students and with external stakeholders. • Invest in and encourage human resources to promote inclusive and sustainable entrepreneurship and innovation through digital communication, collaboration, and networking. • Have communication, collaboration, and networking strategies supported using digital tools. • Develop a clear set of KPIs to guide the implementation of strategies. • Take steps to ensure the continued usefulness and relevance of the institution's digital capacity.
The HEI creates effective collaboration and increases synergies with its	<ul style="list-style-type: none"> • Promote a culture of collaboration within the HEI to build synergies with its entrepreneurial ecosystem.

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entrepreneurial ecosystem and networks.	<ul style="list-style-type: none"> • Ensure effective collaboration and increase synergies at the institutional and faculty levels, in line with the institution's entrepreneurial agenda. • Encourage staff to explore opportunities for knowledge exchange and collaboration. • Reward and recognize collaborative efforts through career progression. • Provide guidance on how to develop and nurture collaborative relationships. • Create a dedicated "knowledge broker" role to establish and nurture entrepreneurial ecosystems.
The HEI is an active partner in the development and implementation of local and regional entrepreneurship and innovation strategies.	<ul style="list-style-type: none"> • Actively seek partnerships with a wide range of external stakeholders. • Involve the entrepreneurial ecosystem in the institution's work through governance, teaching, research, and student support activities. • Play an active role in influencing regional governance and regional/local development, promoting value creation for different parties. • Support the development of entrepreneurship and innovation in schools and colleges through networking and broader engagement. • Provide monitoring and feedback on the shared value developed through stakeholder relationships. • Regularly evaluate and optimize collaborations to fulfill the entrepreneurial agenda.
The HEI has strong links with incubators, accelerators, science parks, and other external initiatives that support the development of a sustainable entrepreneurial ecosystem.	<ul style="list-style-type: none"> • Encourage the joint use of facilities. • Have a direct financial or managerial interest in science parks and incubators, ranging from participation to ownership. • Ensure that the flow of people is encouraged in both directions. • Monitor the sustainability and added value generated through links and cross-fertilization activities.
The HEI integrates research, education, and knowledge exchange to build resilient communities.	<ul style="list-style-type: none"> • Have mechanisms to integrate and absorb information and experiences from the broader ecosystem. • Monitor regional, national, and international research activities to identify new and relevant knowledge. • Initiate dialogue and discussion between the HEI and the external environment for mutual benefit. • Provide support for the identification of new ideas and their mutual exploration. • Have clear mechanisms for exploring business opportunities with commercial and industrial partners.
The HEI reflects global trends and social and ecological challenges in its entrepreneurial agenda.	<ul style="list-style-type: none"> • Ensure that the internationalization strategy reflects its entrepreneurial and innovative agenda. • Build common goals and synergies between the HEI's approach to global, social, and ecological challenges and the entrepreneurial agenda.
The HEI explicitly supports inclusive and sustainable forms of mobility for its staff and students.	<ul style="list-style-type: none"> • Link European and international mobility objectives to the HEI's entrepreneurial agenda. • Promote international mobility through exchange programs, scholarships, grants, and internships that include consideration for disadvantaged, vulnerable, and underrepresented groups. • Apply for European mobility programs and support the inclusive application of staff and students for scholarships, programs, and mobility grants. • Encourage, recognize, and reward inclusive and sustainable international mobility.
The HEI's entrepreneurial agenda contributes to global and social cohesion, climate change mitigation, and the HEI's carbon neutrality.	<ul style="list-style-type: none"> • Explicitly state how sustainable development is addressed in the business agenda. • Include targets for carbon neutrality in the entrepreneurial agenda. • Include environmental goals in all proposed activities to support global, social, and territorial cohesion.
The HEI engages in deep transnational cooperation with other European HEIs. The HEI places European cooperation at the heart of	<ul style="list-style-type: none"> • Consider involvement in deep strategic transnational cooperation (e.g., participation in a European University Alliance, an Innovation Alliance) as a priority. • Take advantage of European Union programs to fund projects focused on innovation and entrepreneurship (e.g., Erasmus+).

Statement	Examples of good practices
its strategy and considers it a driver for creativity and innovation.	<ul style="list-style-type: none"> • Have a policy to disseminate innovative practices and ideas developed in alliances and projects across the institution. • Feed your innovation and entrepreneurship strategy with inspiration from European projects, partnerships, and networks.
The HEI seeks international engagement in all its activities: teaching, research, and knowledge exchange to generate impact at the local, regional, national, and international levels.	<ul style="list-style-type: none"> • Ensure that relationships with international partners support your entrepreneurial agenda. • Develop broad links with international networks and innovation clusters. • Have internal support structures to manage and develop international relationships. • Use networks and partnerships to contribute to the entrepreneurial agenda. • Ensure that all departments and faculties actively participate in international partnerships and networks.
The impact of the HEI's entrepreneurial activities is regularly evaluated across all its activities.	<ul style="list-style-type: none"> • Define clear intended outcomes/impacts related to the objectives of the entrepreneurial and innovation agenda. • Collect regular evidence of the results/impacts of the entrepreneurial agenda. • Use evidence of outcomes/impacts as a tool for reflection and review of the institution's strategy and mission.
The HEI evaluates the impact of its entrepreneurial agenda with key performance indicators, narratives, and dedicated assessment tools.	<ul style="list-style-type: none"> • Ensure that all objectives of the HEI's entrepreneurial agenda have associated indicators or measures of success. • Have indicators or measures of success that are feasible to collect and standardize. • Design or adopt existing relevant measurement tools for standardized data collection. • Incorporate data collection into routine activities associated with the entrepreneurial agenda. • Establish a baseline, especially for assessing skills and competencies. • Have a dedicated monitoring and evaluation plan that is reported to senior leadership as part of the strategic cycle, which includes regular assessments.
Performance indicators allow for comparisons with other national or international peer institutions.	<ul style="list-style-type: none"> • The performance indicators implemented at the HEI are aligned with the ambitions of the entrepreneurial agenda and are internationally recognized/used by other HEIs as measurement tools. • HEIs are open to making the results of their performance indicators available.
The learning generated by the impact assessment drives the development of the HEI's entrepreneurial and innovation activities to increase its future impact.	<ul style="list-style-type: none"> • Leadership is committed to reflecting on the results of the impact assessment on the entrepreneurial agenda. • The results of the impact assessment are widely available to all stakeholders involved in the entrepreneurial agenda. • There is a strong commitment from stakeholders to learn from the results and instigate course corrections to improve the entrepreneurial agenda. • Resources (including funding) are available to make changes or improvements, if necessary.

Source: adapted from HEInnovate (2025).