

ARTIGO

**INDICATORS OF THE THIRD UNIVERSITY MISSION: PERSPECTIVES TO
MEASURE UNIVERSITIES CONTRIBUTIONS TO SOCIETY**

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ABSTRACT: The university-society relationship, called the third university mission, is constantly changing in an attempt to keep up with social, economic and cultural demands. Measuring the university's activities and sharing it with society is to meet the principles of governance, such as transparency, accountability and responsibility. This article aims to identify possible indicators of the third university mission and the main concepts and constructs related to the theme. Although similar, the research differentiates the concepts 'third mission' (European concept) and 'extension' (Latin American concept) according to the portfolio of their indicators and the scope of the terms. A systematic literature review (RSL) and bibliometric analysis were carried out using the Systematic Search Flow (SSF) method. It is concluded that measuring the activities of the third university mission and its social impacts, despite all academic and governmental efforts, is not an easy task. The difficulty lies in the multiple activities and interpretations of what the third mission is, however, as a result of the research the main indicators that cover the theme will be presented.

Keywords: third mission, university, indicators, KPI.

INDICADORES DA TERCEIRA MISSÃO UNIVERSITÁRIA: PERSPECTIVAS PARA MENSURAR AS CONTRIBUIÇÕES DAS UNIVERSIDADES PARA A SOCIEDADE¹

RESUMO: A relação universidade-sociedade, chamada terceira missão universitária, está em constante mudança, na tentativa de acompanhar as demandas sociais, econômicas e culturais. Mensurar as atividades da universidade e compartilhar com a sociedade é atender aos princípios da governança, como transparência, prestação de contas e responsabilidade. Este artigo objetiva identificar possíveis indicadores da terceira missão universitária e os principais conceitos e construtos relacionados ao tema. Embora similares, a pesquisa diferencia os conceitos “terceira missão” (conceito europeu) e “extensão” (conceito latino-americano), em função do portfólio de seus indicadores e do alcance dos termos. Desenvolveu-se uma revisão sistemática de literatura (RSL) e da análise bibliométrica, por meio do método Systematic Search Flow (SSF). Conclui-se que mensurar as atividades da terceira missão universitária e seus impactos sociais, apesar de todos os esforços acadêmicos e governamentais, não é uma tarefa fácil. A dificuldade está nas múltiplas atividades e interpretações do que é a terceira missão. Porém, como resultado da pesquisa, serão apresentados os principais indicadores que abarcam o tema.

Palavras-chave: terceira missão, universidades, indicadores, KPI.

INDICADORES DE LA TERCERA MISIÓN UNIVERSITARIA: PERSPECTIVAS PARA MEDIR LAS CONTRIBUCIONES DE LAS UNIVERSIDADES A LA SOCIEDAD

RESUMEN: La relación universidad-sociedad, denominada la tercera misión universitaria, está en constante cambio en un intento de mantenerse al día con las demandas sociales, económicas y culturales. Medir las actividades de la universidad y compartirlas con la sociedad es cumplir con los principios de gobierno, como la transparencia, la rendición de cuentas y la responsabilidad. Este artículo tiene como objetivo identificar posibles indicadores de la tercera misión universitaria y los principales conceptos y constructos relacionados con el tema. Aunque similar, la investigación diferencia los conceptos 'tercera misión' (concepto europeo) y 'extensión' (concepto latinoamericano) según el portafolio de sus indicadores y el alcance de los términos. Se realizó una revisión sistemática de la literatura (RSL) y un análisis bibliométrico utilizando el método Systematic Search Flow (SSF). Se concluye que medir las actividades de la tercera misión universitaria y sus impactos sociales, a pesar de todos los esfuerzos académicos y gubernamentales, no es tarea fácil. La dificultad radica en las múltiples actividades e interpretaciones de lo que es la tercera misión, sin embargo, como resultado de la investigación se presentarán los principales indicadores que abarcan el tema.

Palabras clave: tercera misión, universidades, indicadores, KPI.

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INTRODUCTION

Historically, since its formation as a social institution, the university has been driven by social needs. The university missions have been evolving and following the demands of society. The first university mission, teaching, is registered in the twelfth century, in Europe, and later in Brazil, in the first half of the twentieth century, influenced by the German and French models (PAULA, 2009). The second mission, research, emerged in the early nineteenth century, in Germany (1810), with a broader proposal that involved political, economic, and cultural issues (GIMENEZ; BONACELLI, 2016). In Brazil, a milestone that demonstrates the promotion of science, through research, is the decree that created the University of São Paulo (USP), in 1934 (SÃO PAULO, 1934).

In the sequence, the third university mission appears, dating from the second half of the 19th century. The use of the expression "university extension" emerged at Oxford University during discussions about the need for reforms, around the 1850s, in a post-Industrial Revolution context (GIMENEZ; BONACELLI, 2016). In Brazil, the expression appears in records such as the University Reform Law, Law No. 5.540/1968 (BRASIL, 1968), which established the inseparability between teaching, research, and extension.

Of the three university missions, the latter is the least developed regarding methodologies and tools for the evaluation and management of its activities (MAXIMIANO JUNIOR, 2019). Given its nature, which arises to coexist with the other missions and bridge the gap between university and society, its definitions and actions are broad and regionalized. The portfolio of the third mission is related to the profile and mission of each university, considering that there are different types of universities: focused on teaching, focused on research, and focused on regional development and entrepreneurship; and also, public and private. Thus, it is possible to understand the diversity of conceptions and activities. Added to this is the distinction between countries regarding which types of activities should be included in the 3M content. According to Secundo et al. (2017), in Germany the focus is on technology transfer from universities to companies, while Latin America includes a broader concept of university extension to meet community needs.

Importantly, the concepts third mission and extension have different amplitudes, and while they are similar in defining the university's relationship with society, they are not the same. In terms of geographical scope, the former is used in Europe, North America and Asia, the latter, exclusively in Latin America. The first has a primarily economic approach (university as an engine of the economy and socio-economic progress); the second, primarily social (cultural diffusion and social services). University extension has a social engagement approach (MAXIMIANO JUNIOR, 2019), with a predominance of cultural dissemination activities and social services targeting disadvantaged groups (DETMER LATORRE et al., 2014).

For purposes of approach and dimension of what is intended to measure, the term third mission (3M) will be used, as it is understood that the choice best meets the purpose of seeking indicators that can measure, in its breadth, the university-society relationship. The definition that represents this approach is described by Molas-Gallart and Castro-Martínez (2007, p. 321): "[...] We use the term 'third mission' to refer to all the activities concerned with the generation, use, application and exploitation of knowledge and other capabilities of universities outside academic environments." According to the Forum of Pro-Rectors of Extension of Brazilian Public Institutions of Higher Education, "University Extension, under the constitutional principle of inseparability between teaching, research and extension, is an interdisciplinary, educational, cultural, scientific and political process that promotes transformative interaction between the university and other sectors of society" (FÓRUM DE PRÓ-REITORES DE EXTENSÃO DAS UNIVERSIDADES PÚBLICAS BRASILEIRAS, 2012, p. 42).

In conceptual terms, third mission and extension represent, among the university's missions, those that exchange with other social sectors, dialogue, and promote the exchange of knowledge, overcoming the discourse of academic hegemony (ivory tower) and replacing it by the

idea of alliance with other sectors of society. However, the main difference is in the portfolio of indicators.

When analyzing the 3M indicators, it can be seen that there is an effort to include all activities related to university-society interaction, including teaching (primarily with indicators of continuing education), research (primarily with indicators of technology transfer and innovation), and social commitment. When analyzing the extension indicators of Brazilian universities, it appears that they fail to represent some results of the university-society relationship when they refer to teaching and research activities. This is because the indicators are presented in the Institutional Development Plans (IDP) under another format or dimensions, and analyzed separately: indicators of teaching, research indicators and extension indicators, among others.

Although there is no consensus about the activities of the third mission of universities (MOLAS-GALLART; CASTRO-MARTÍNEZ, 2007; SECUNDO et al., 2017), this article aims to present the main definitions about the third university mission and the most used indicators to measure the possible social impact of universities. The research is carried out by means of systematic literature review (RSL) and bibliometric analysis, by means of the Systematic Search Flow (SSF, systematic search flow, in Portuguese) method, with the purpose of showing an extract of the subject matter object of the study. The next sections present the theoretical framework, the methodology, and the analysis and discussion of the results.

THEORETICAL REFERENCE

Institutions that receive public resources are being confronted by society that demands transparency and accountability (DE LA TORRE, AGASISTI; PEREZ-ESPARRELLS, 2017). Universities are in a constant transformation process, triggered by the need to be more competitive and meet the emerging demands of society. Evaluation is an activity that conjures up service quality, process improvement, management improvement, and accountability to society. Strategically, it can be used to support management and governance in search of policies that meet social needs (SCHMITZ; ARGOLLO; TENÓRIO, 2009).

Evaluation practices are relevant instruments for institutional governance. In the case of Higher Education Institutions (HEIs), evaluation can go beyond research and teaching (which historically have well consolidated indicators) to address civil society stakeholders, including community services, partnerships, and technology transfer, with the 3M indicators (VARGIU, 2014).

According to Frondizi et al. (2019), the European Commission and the Organization for Economic Cooperation and Development (OECD) in 2012 pointed to the unprecedented challenges of higher education in defining its purpose, role, organization, and scope in society and the economy. In this context, performance management and measurement represent tools with which universities could gain acceptance from stakeholders (the interested parties) (FRONDIZI et al., 2019).

To measure social impacts, the development of appropriate indicators to evaluate them is necessary (VARGIU, 2014). Indicators of the third university mission can serve as a tool to support the management of the third mission activity and to guide policy and research actions on its nature and impact. The development of indicators has become a key component for policy implementation (MOLAS-GALLART; CASTRO-MARTÍNEZ, 2007).

In late 2001, the United Kingdom funded research to develop a system of indicators of the third university mission to create criteria for the distribution of funds to British universities and foster the third stream (third mission) of activities. The research conducted by the Russell Group in 2002 pointed out the need for a comprehensive definition of 3M and stated that a more complex system of indicators would be needed, beyond what was envisaged (MOLAS-GALLART; CASTRO-MARTÍNEZ, 2007).

Other recent studies show that governments in Europe, especially Italy and Spain, aiming to allocate financial resources based on the performance achieved by public universities, focus on intellectual capital (IC) as a representation of the greatest asset of universities. Therefore, managing and measuring it is a key issue and can also be an evaluation tool within the third mission (FRONDIZI et al., 2019).

Intellectual capital (IC) is the main "product"² of HEIs. For Kalemis (2014), IC is a performance metric that makes it possible to make tangible what was intangible and difficult to measure. For Secundo et al. (2017), the development of IC represents the main mission of HEIs, so it is necessary to generate performance metrics to measure them.

METHODOLOGY

In order to identify the indicators of the third university mission, as well as the main concepts and constructs related to the topic, the Systematic Search Flow method is used. According to Ferenhof and Fernandes (2016), the method is composed of four phases. The first phase comprises the search strategy, database consultation, library organization, standardization of article selection, and, finally, composition of the article portfolio. The protocol followed to contemplate each of the stages is described in chart 1.

Cart 1 - Research protocol.

| Phase 1 - Definition of the Research Protocol | |
|--|--|
| 1.1 Search Strategy | The search strategy was to use the search terms ("Third mission") AND (<i>Universit*</i>) AND ("indicators" OR KPI), searching the three sentences, represented by quotation marks, with the logical operator AND. The partial name <i>Universit*</i> was entered using wildcard characters (*) to search all endings of the name (plural and singular), and the Boolean operator OR to find the terms Indicators or short for Key Performance Indicators (KPI). The scientific language is in English, so it is recommended to search in this language in order not to lose international documents, and so it was done. For a better understanding of the search terms, in Portuguese, they would be: " <i>Terceira Missão</i> " and <i>Universidade*</i> and <i>Indicadores</i> . |
| 1.2 Database consultation | The databases chosen were Web of Science (WOS) and Scopus, consulted through the Capes Periodicals Portal. The same query was used in both databases: ("Third mission") AND ("Universit*") AND ("indicators" OR KPI). There were no limitations on the year of publication or type of document. The search by topic resulted in 24 publications in SCOPUS and 33 in WOS. The search by topic includes title, abstract, author's keywords, and Keywords Plus. |
| 1.3 Organization of the bibliography | The EndNote Online tool available on the Capes portal was used. This tool is a bibliographic indexing software that collects the references searched in the databases online, imports the references, and organizes them, facilitating the analysis and exclusion of duplicate data. The consultation took place in January 2021. |
| 1.4 Standardization of article selection | First, duplicate articles were excluded, leaving 32 WOS and 9 Scopus; second, articles that were not available in full and free of charge were excluded, which totaled 7; third, articles that were not in English, Portuguese, or Spanish were excluded due to the difficulty of reading them. Then, 2 articles in Russian and 1 in German were excluded, totaling 3; fourth, the titles, abstracts, keywords, and results of each article were read, selecting those with adherence to the research theme. At this point, 14 articles were excluded. |
| 1.5 Composition of the article portfolio | Finally, the remaining articles were read in their entirety to ensure that they met the objective, and the final portfolio was composed of 18 articles. |

Source: Primary research data.

Regarding the search strategy, it is worth clarifying the use of the English terms "Third mission" AND *Universit** AND "indicator*" OR KPI, used following the guidelines of the method,

² The definition of the word product in the context of the article is in the sense of result or effect of a human action and as a result of a creation.

which resulted in a primarily European portfolio. We consulted the same database (Capes Periodical Portal) with the words in Portuguese ("*Terceira Missão*" and *Universidad** and *Indicador**), however, the search did not present results with adherence to the theme. For the proposal of this research, it would not fit to apply the search with the similar term extension, because as explained in the introduction, we are not looking for extension indicators, but rather for third mission indicators.

Following the methodology, phase 2 is the data consolidation. In this phase, we exported the file from the bibliographic indexing software to a spreadsheet. We used the spreadsheet to manage the information and a set of folders was created, the first one was called Synthesis Matrix, which was composed of all the 18 articles analyzed in full. Other folders were created to facilitate the analysis and were divided by topics considered important for the study: number of publications per year, keywords, countries of publication, database, and indicators. Finally, phase 3 of the Systematic Search Flow (SSF) methodological procedure, synthesis, and reporting, will be presented in the sequence, in analysis and discussion of the results. Phase 4 of the SSF method is the writing of this article.

ANALYSIS AND DISCUSSION OF RESULTS

As highlighted in the introduction, there are two objectives of this study: the first is to understand the definitions of the third university mission presented by the authors that make up the study portfolio; the second is to identify 3M dimensions and indicators most used by researchers. Table 1 presents the countries of origin of the first author of the portfolio articles and the number of publications per year. The concentration occurs in Europe, a continent that is the cradle of research on the subject, and the publications are more expressive as of 2014.

Table 1 - Countries of origin of the first author of the article and year of publication.

| Country | Frequency | Year of Publication |
|-----------|-----------|--|
| Italy | 8 | 2013, 2014 (2), 2017, 2018 (2), 2019 (2) |
| Spain | 4 | 2007, 2010, 2012, 2017 |
| Romania | 1 | 2017 |
| Greece | 1 | 2014 |
| France | 1 | 2017 |
| Australia | 1 | 2015 |
| Hungary | 1 | 2015 |
| Portugal | 1 | 2019 |

Source: Primary research data.

A great interest is visible in Europe in defining a set of 3M dimensions, activities and indicators capable of serving the different universities and stakeholders (government, industry and society in general). European government initiatives aim to encourage research on the impact of universities on society through the third mission, focusing on the ability to ensure effective university management and secure financial resources through partnerships. The Russel Group Report, the result of the research *Measuring Third Stream Activities*, of the Russel Group of Universities, published in the United Kingdom in 2002, was used for evaluation of financing decisions in the scope of third mission activities (SOEIRO, 2012). From then on, more investments in research related to 3M emerged, mainly in Europe.

Another important research is the E3M Project - European Indicators and Ranking Methodology for University Third Mission (2009-2012). The project emerged with the aim of generating a comprehensive instrument to identify, measure and compare the 3M activities of HEIs and was co-funded by the European Commission under its Lifelong Learning Program (MAXIMIANO JUNIOR, 2019). The research resulted in the creation of indicators on third mission activities, with a new approach to the concept and new classification methodologies (E3M PROJECT, 2021). The proposal is widespread today and covers three dimensions: Continuing Education (CE), Technology Transfer and Innovation (TTI), and Social Engagement (ES).

Table 2 shows the keywords most frequently used by the authors of the portfolio. In highlight, the terms third mission (8), universities (7), intellectual capital (6), performance measurement (6), indicators (4), higher education (3), evaluation (3), efficiency of universities (2), university-industry (2) and entrepreneurial university (2). In the table, the terms were kept in the original language of the texts (English), as well as in the figure below, the word cloud.

Table 2 - Frequency of the keywords of the articles that make up the portfolio (selected frequency ≥ 2).

| Key Words | Frequency |
|-----------------------------------|-----------|
| <i>Third Mission</i> | 8 |
| <i>Universities/ University</i> | 7 |
| <i>Intellectual capital</i> | 6 |
| <i>Performance measurement</i> | 6 |
| <i>Indicators</i> | 4 |
| <i>Higher education</i> | 3 |
| <i>Evaluation</i> | 3 |
| <i>Universities' efficiency</i> | 2 |
| <i>University-industry</i> | 2 |
| <i>Entrepreneurial university</i> | 2 |
| <i>International ranking</i> | 2 |

Source: Primary research data.

Figure 1 - Word cloud using the keywords of the articles that make up the portfolio.

Chart 2 - Theoretical Framework of the 3M Definitions of the Portfolio.

| Author | Title of the Article | Year | Definition* |
|---|--|------|--|
| Molas-Gallart e Castro-Martínez | <i>Ambiguity and conflict in the development of "Third Mission" indicators</i> | 2007 | "[...] We use the term 'Third mission' to refer to all the activities concerned with the generation, use, application and exploitation of knowledge and other capabilities of universities outside academic environments" (MOLAS-GALLART; CASTRO-MARTÍNEZ, 2007, p. 321). |
| Ramos-Vielba; Fernández-Esquinas e Espinosa-De-Los-Monteros | <i>Measuring university-industry collaboration in a regional innovation system</i> | 2010 | "[...] knowledge generation and application outside the academic environment [...] complex map of interactions between universities and companies regionally" (RAMOS-VIELBA; FERNÁNDEZ-ESQUINAS; ESPINOSA-DE-LOS-MONTEROS, 2010, p. 650-651). |
| Carrión et al. | <i>New methodology for measuring third mission activities of universities</i> | 2012 | "[...] a Third Mission, often underdeveloped by universities, has emerged to include in their missions the activities that facilitate their engagement with society and industry" (CARRIÓN et al., 2012, p. 1). |
| Piva e Rossi-Lamastra | <i>Systems of indicators to evaluate the performance of university-industry alliances: a review of the literature and directions for future research</i> | 2013 | "[...] collaborations with industry are the third mission of university systems. When this occurs, the mission is fulfilled properly, it benefits companies, universities and society in general" (PIVA; ROSSI-LAMASTRA, 2013, p. 40). |
| Kalemis | <i>Scope and Aims of Intellectual Capital Management and Reporting</i> | 2014 | "[...] relational capital is related to the various types of relationships with its stakeholders and very similar to what is known as the Third Mission; [...] Relational capital includes all activities and relationships between the university and non-academic partners: businesses, non-profit organizations, public authorities, local government, and society as a whole" (KALEMIS, 2014, p. 1,321). |
| Secundo e Elia | <i>A performance measurement system for academic entrepreneurship: A case study</i> | 2014 | "[...] the entrepreneurial university model implements a process of academic entrepreneurship that fulfills the third mission of the university" (SECUNDO; ELIA, 2014, p. 24). |
| Vargiu | <i>Indicators for the Evaluation of Public Engagement of Higher Education Institutions</i> | 2014 | "[...] The term 'third mission' is generally used to refer to the direct and indirect contributions of universities to society" (VARGIU, 2014, p. 562). |
| De Rassenfosse e Williams | <i>Rules of engagement: measuring connectivity innational systems of higher education</i> | 2015 | "[...] under the heading of the third mission, 'Research' and 'teaching and learning' can be incorporated, although to complete the taxonomy, we need to add 'scholarship'" (DE RASSENFOSSE; WILLIAMS, 2015, p. 944). |
| Kotosz et al. | <i>How to measure the local economic impact of universities? Methodological overview</i> | 2015 | "[...] the commitment of third generation universities includes the third mission: to create and maintain partnerships with economic actors external to the university, absorbing existing knowledge" (KOTOSZ et al., 2015, p. 4). |
| Secundo et al. | <i>An Intellectual Capital framework to measure universities' third mission activities</i> | 2017 | "[...] The third mission activities of universities are related to the generation, use, application, and valorization of knowledge with external stakeholders and society at large" (SECUNDO et al., 2017, p. 229). |
| De La Torre, Agasisti and Perez-Esparrells | <i>The relevance of knowledge transfer for universities' efficiency scores: an empirical approximation on the Spanish public higher education system</i> | 2017 | "[...] The third mission is the university's relationship with the non-academic world and the outside world: industry, public authorities, and society and involves collaboration between higher education institutions and their larger communities (local, regional, state, national, global) for the mutually beneficial exchange of knowledge and resources for the benefit of the |

| Author | Title of the Article | Year | Definition* |
|---------------------------------|---|------|---|
| | | | economy and society" (DE LA TORRE, AGASISTI; PEREZ-ESPARRELLS, 2017, p. 211). |
| Urdari; Farcas and Tiron-Tudor. | <i>Assessing the legitimacy of HEIs' contributions to society The perspective of international rankings</i> | 2017 | "[...] Their traditional missions have expanded, shifting from teaching to research and eventually adding a third mission, called "contribution to society" (URDARI; FARCAS; TIRON-TUDOR, 2017, p. 191). |
| Hadăr and Purcărea | <i>A new set of performance indicators for improving the capitalization process of Intellectual Property</i> | 2017 | "[...] The performance indicators of technology transfer activities / intellectual property capitalization knowledge in a university and the accompanying indicators of academic entrepreneurship are in close correlation from the point of view of the objectives and strategy adopted, in the context of the third mission assumed by universities of the 21st century" (HADĂR AND PURCĂREA, 2017, p. 994). |
| Secundo et al. | <i>Intellectual capital management in the fourth stage of IC research A critical case study in university settings</i> | 2018 | "[...] The activities of the third mission of universities are related to the generation, use, application and exploitation of knowledge with external stakeholders and society at large" (SECUNDO et al., 2018, p. 229). |
| Di Berardino and Corsi | <i>A quality evaluation approach to disclosing third mission activities and intellectual capital in Italian universities</i> | 2018 | "[...] The concept of the third mission refers to a diverse range of activities aimed at transferring useful knowledge to society and organizations to develop entrepreneurial skills, innovation, social welfare and sound human capital, and promoting the development of science and society through various forms of social communication and engagement" (DI BERARDINO; CORSI, 2018, p. 179). |
| Frondizi et al. | <i>The Evaluation of Universities' Third Mission and Intellectual Capital: Theoretical Analysis and Application to Italy</i> | 2019 | "[...] Knowledge creation by ecosystems (whether national or local), rather than by individual organizations, is aligned with the third mission approach, where universities build ties and relationships with their local communities to enhance their development and create shared knowledge" (FRONDIZI et al., 2019, p. 2). |
| Agasisti, Barra and Zotti | <i>Research, knowledge transfer, and innovation: The effect of Italian universities' efficiency on local economic development 2006-2012</i> | 2019 | "[...] Universities can drive local economic development in several ways: via knowledge transfer through education and human resource development (i.e., the human capital of students and graduates); via knowledge creation and regional innovation through research (i.e., publications); and finally, through technology transfer activities (i.e., the third mission)" (AGASISTI, BARRA, AND ZOTTI, 2019, p. 821). |
| Cinar | <i>Delving into social entrepreneurship in universities: is it legitimate yet?</i> | 2019 | "[...] Third mission activities - occasionally referred to as 'third stream' - corresponds to links that universities establish with actors in external environments, such as businesses, government agencies, the public, social enterprises, and non-governmental organizations" (CINAR, 2019, p. 220). |

*The excerpts reproduced were freely translated by the authors.

Source: Primary research data.

The definitions and contexts related to the theme presented by the 18 authors that make up the portfolio have in common the perspective that 3M is the mission, among the three historical missions of the university. According to the authors, it is responsible for going beyond the limits or the walls of the university and for forming partnerships, sharing results, and coproducing with external actors (government, companies, non-governmental organizations, and society in general) through technology transfer, continuing education, and social commitment.

Outstanding concepts

It is considered fundamental to highlight some intrinsic concepts that are directly related to the third mission theme for the full understanding of the proposed approach. They are: knowledge society, innovation, entrepreneurship, intellectual capital, triple helix, social impact, and communication. These concepts will be discussed in the following sections.

Society of Knowledge

Regarding universities, the literature on knowledge society has been shifting the analytical focus from technology transfer to the broader concept of knowledge exchange (MOLAS-GALLART; CASTRO-MARTÍNEZ, 2007). According to Vargiu (2014), the UK Government's White Paper on science and innovation attributes a central role to universities acting as "dynamos of growth" in the knowledge economy: "[...] not only creators of knowledge, shapers of minds and transmitters of culture, but [...] also major agents of economic growth" (VARGIU, 2014, p. 563).

Innovation

Innovation includes new services, products and technologies and even the upgrades of existing technologies. One of the modern mechanisms for exploiting the intellectual capital of universities is the creation of start-up and spin-off companies, through which technology and innovation can reach the market (HADĂR; PURCĂREA, 2017). Developing indicator systems to assess the performance of (university-industry) collaborations, enable companies to innovate, and periodically measure the results of these collaborations to ensure efficiency and effectiveness in innovation outcomes are not easy tasks. Innovation is, by its very nature, a complex and multidimensional concept (PIVA; ROSSI-LAMASTRA, 2013).

Entrepreneurial University

HEIs must play an active role in the social and economic context of society, and to do so, a broader culture of the educational mission is required, rather than a narrow perspective of preparing students for the world of work. In the face of resource constraints, entrepreneurship and other forms of social engagement will be necessary to raise funds from different sources (SOEIRO, 2012). The third mission is closely linked to the entrepreneurial activities of universities and promotes socially significant impact through university output (such as research, articles, patents) (KOTOSZ et al., 2015). An entrepreneurial university supports the creation of entrepreneurial attitudes by being a driver of the economy and is increasingly involved with the industrial sector as a provider of human capital and fosterer of incubators, start-ups, and diffusion of an entrepreneurial culture (SECUNDO et al., 2017). The limitations of the public and private sectors to produce responses that enable solutions to social challenges are recognized, and entrepreneurship has been recognized as a potential mechanism that helps in the responses. Regarding social entrepreneurship, there has been a request from the European Commission, in its Entrepreneurship 2020 Action Plan, for universities to foster and contribute to actions in this area. However, for Cinar (2019), there were no significant manifestations, or almost no contributions.

Intellectual capital (IC)

According to Kalemis (2014), the real wealth of intellectual capital lies not only in the sum of its constituent elements, but in the connections between them. Considering the university context, human capital is the knowledge that resides in individuals, which includes professors,

researchers, students, and administrative staff. Structural (or organizational) capital comprises the principles of governance, procedures, systems, university culture, databases, publications, and intellectual property, among others. Relational (or social) capital comprises the various types of relationships of the university with its stakeholders, analogous to what is known as the third mission (KALEMIS, 2014). Accountability through the measurement of IC has been used in several countries. Secundo and Elia (2014) present some reports used by organizations focusing on university IC: 1) European Commission, in 2006, proposed the RICARDIS document - Reporting Intellectual Capital to Increase Research, Development and Innovation; 2) the Intellectual Capital Report 1999-2004, from Austrian Research Centers, became the mandatory basis for intellectual capital reporting in Austrian universities; 3) the Observatory of European Universities, in 2006, under the PRIME Excellence Network, proposed the Intellectual Capital Report for universities (SECUNDO; ELIA, 2014). In Brazil, a study presented in 2017, whose objective was to analyze the evidencing of information on intellectual capital in the management reports of federal public universities in the country, demonstrated that the material presented is not sufficient as a form of accountability for Brazilian public institutions and suggests that evidence was found in the reports, however, aimed at the control bodies (SILVA, 2017). It is understood that reporting, measuring, and managing the intangible assets of HEIs (which in the university context is synonymous with IC) is an international trend, but nationally still little explored.

Triple Helix

The triple helix model (Etzkowitz and Leydesdorff's triple helix thesis, 1995) analyzes university-business-government relations. In light of this model, in a knowledge-based society, universities can promote innovation and economic development through their missions. This requires a hybrid relationship between universities-industries-governments, generating new institutional and social arrangements that provide for the production, transfer, and application of knowledge (FRONDIZI et al., 2019).

Social impact

The new characteristics of universities demonstrate the difficulty of identifying appropriate frameworks to evaluate their performance and social impact, particularly in relation to the intangible assets generated, but the strategy of measuring impact through IC at the social and regional level is not without risks (KALEMIS, 2014). Therefore, whatever the modes of public engagement, their promotion and visibility, as well as the need to assess their real social impact, require the development of appropriate indicators to evaluate them (VARGIU, 2014). It is complex and difficult to measure impact, to the extent that this would require analyzing reports from external parties to identify how well their needs have been met (DE RASSENFOSSE; WILLIAMS, 2015). In this sense, the need for social impact assessment from society's perspective is understood, and not solely from the university's perspective.

Communication

One of the main means of publicizing university activities and performances occurs via academic rankings, which position HEIs in national and international competitions, but which generally evaluate the most traditional forms: research and teaching (VARGIU, 2014). Although the use of these rankings has generated many controversies, rankings are a reference for the quality of higher education and are considered external evaluation systems (URDARI; FARCAS; TIRON-TUDOR, 2017).

One concern is that international rankings may divert regional and national research activities and engagements to areas that are only of international interest (DE RASSENFOSSE; WILLIAMS, 2015). So far, no ranking has paid much attention to socioeconomic interconnections, despite the worldwide interest in third mission activities (URDARI; FARCAS; TIRON-TUDOR, 2017). Among the most reputable rankings - Academic Ranking of World Universities (ARWU) (SHANGHAI RANKING, 2022), World University Rankings (QS) (QS WORLD UNIVERSITY RANKINGS, 2023) and Times Higher Education (THE) (TIMES HIGHER EDUCATION, 2022) -, only THE considers a single dimension related to 3M (knowledge transfer to industry, but with the weight of 2.5% of the total), and the others do not measure 3M activities.

The most expressive ranking, which prioritizes the activities of the third mission, is the U-Multirank (UMR) (U-MULTIRANK, 2022), which makes a multidimensional ranking (FRONDIZI et al., 2019). U-Multirank enables the user to compare universities according to their interest: by field of study, country, and performance. It brings traditional rankings (teaching and research) and dimensions that address 3M such as knowledge transfer, regional engagement, and international orientation.

3M Indicators

Measuring the performance of the third mission becomes more challenging than the other traditional missions, as there is no consensus on the third mission activities of universities (SECUNDO et al., 2017). Added to the lack of consensus regarding the activities is the difficult task of measuring the intangible, the intellectual capital of universities. We highlight the objectives that motivated the use of metrics, through the perspective of intellectual capital, to measure the main activities and impacts of the third university mission, and that are related to the three objectives or dimensions of the project E3M (2012):

- Develop business competence in human capital for innovation and development.
- Technology transfer and innovation linked to the concept of capacity to act and realize development.
- Social engagement and regional development that promotes the exchange of knowledge and entrepreneurial skills to create social value. (SECUNDO et al., 2018, p. 161).

Analyzing the indicators proposed in the articles of the portfolio, it is concluded that the proposal presented in the research An Intellectual Capital Framework to Measure Universities Third Mission Activities, of the Project "Quality Assurance in Higher Education through Enabling and Auditing", developed by Secundo et al. (2017), represents the main objectives/dimensions, processes and indicators related to 3M, and, therefore, serves as a foundation for the final proposal of this research. We will adopt the IC definition model proposed by the aforementioned author, which is divided into human capital (CH), organizational capital (OC), and social capital (CS). The concepts are described for understanding the distribution of the indicators:

- Human capital - refers to the intangible value that resides in the competencies of people; this includes the expertise, knowledge, and experiences of researchers, professors, technical staff, students, and administrative staff.
- Organizational (or structural) capital - comprises the intangible resources that are found in the organization itself: it includes, among others, databases, intellectual property, research projects, research infrastructure, research and teaching processes and routines, university culture, and governance processes.
- Social (or relational) capital - refers to the intangible resources and capabilities capable of generating value linked to the university's internal and external relationships. This includes its relationships with public and private partners, networks and alliances, academic prestige, its brand, partnerships with the business sector and regional governments, its links with non-profit organizations and civil society in general, collaborations with national and international organizations. (SECUNDO et al., 2017, p. 231).

Next, it is proposed, in Table 3 (available in Appendix A), the framework of indicators (KPI - Key Performance Indicators) that best identify and measure 3M, following the perspective of Secundo et al. (2017) regarding the objectives, processes and intellectual capital and adding indicators referenced by other authors of the portfolio. However, to adapt to the Brazilian reality, in addition to the indicators identified in the literature review (which primarily meet a profile of European and entrepreneurial universities), indicators used in Brazilian HEIs were included, especially those unique to our social and economic reality (such as number of scholarships, affirmative action quotas, junior companies, provision of services and healthcare services to the community), because they do not appear in the portfolio indications. To include them, we used as reference the indicators of the Federal University of Santa Catarina (UNIVERSIDADE FEDERAL DE SANTA CATARINA, 2020). The proposal intends to measure the indicators using the "time" reference. Considering that the lifetime of the indicators is linked to the Institutional Development Plan (IDP) of the HEIs and, with the perspective of using them in future research in Brazilian public federal universities in which 78% of the IDPs are prepared for the period of five years, it is proposed that the indicators be measured annually, over a period of five years.

The indicators presented in table 3 are a starting point for the development of a comprehensive framework to measure and evaluate the third university mission and, most importantly, to make visible and measurable the various activities carried out through university-society connections and alliances, and can be used as a tool to measure the social impact of universities. Chart 3 proposes to measure the three 3M objectives (technology transfer and innovation, continuing education, and social commitment) by means of indicators from the perspective of the intellectual capital of HEIs. Thus, the research suggests 18 indicators for human capital, 19 for organizational capital, and 15 for social capital.

For Kalemis (2014), HEIs must demonstrate management of their resources and responsibility through clearly defined and feasible objectives. The management and measurement of intellectual capital (IC) contribute to making the best use of available resources, in addition to meeting the principles of governance and transparency. It is important to highlight that indicators are considered as approximations and representations of reality and, therefore, provide a partial view that must be complemented with other types of analysis (RAMOS-VIELBA; FERNÁNDEZ-ESQUINAS; ESPINOSA-DE-LOS-MONTEROS, 2010). For Soeiro (2012), all that is possible is to select relatively reliable activities and robust indicators as proxies for impacts. It is understood that there is no general definition and even less a closed framework of indicators to measure the 3M. The proposal is to present an extract of current studies, contributing to university management.

FINAL CONSIDERATIONS

Measuring the activities of the third university mission and its social impacts, despite all the academic and governmental efforts, is not an easy task. The difficulty lies in the multiple activities and interpretations, in the lack of academic records when no financial resources are involved, and in the various university missions, each with its own strategic and regionalized objectives.

Although difficult, it is not possible to get rid of this assignment, it is no longer possible, for universities, to go back to the time when teaching for its own sake and pure research were the foundations of the institution (ivory tower). The knowledge society is based not only on the transfer, but on the exchange of knowledge, the co-creation of projects, the hybrid relationship between HEIs, industry, government and society, that is, it is also based on the third mission.

It is necessary to pay attention that the third mission of universities does not prioritize only the activities that generate economic results (licenses, patents, spin-offs, research contracts, and

companies in incubators). Attention should also be focused on the social sciences and humanities to understand how their activities can generate social impact; an approach that has been little explored so far. It is understood that it is possible to reconcile the commitment and social responsibility of universities by contributing to meet social and economic demands, including through technology transfer, innovation, and entrepreneurial education.

Communication is one of the main instruments for the development of HEIs. The disclosure of activities and results brings the HEI closer to society. The dialogue must be two-way, the contributions and exchanges of experiences, knowledge, and research results must be shared with the general public. Good communication facilitates internal politics and aids in attracting resources and investments for the HEI to continue contributing, in all areas of knowledge, to the social and economic development in which it is inserted.

Fronzizi et al. (2019) recalls the legacy of Clark Kerr to the University of California (UC), in 1963, when he introduced the concept of multiversity, which represented a complex university of many different purposes and functions, whose idea was to ensure economic autonomy, not only receiving public resources, but also via research contracts with external users, emerging then a third mission with the ability to connect with external environment and produce answers to society, in a mutual and continuous exchange. In this exchange lies the viability of raising funds so that the university missions are not affected by the financial limitations that have been increasing every year.

The study presented the proposal of a set of indicators that make it possible to provide some degree of measurement and evaluation of the university-society relationship, based on the theoretical framework of the research. It also sought to contribute with the perspective of measuring, including, the intellectual capital (the intangible assets), contributing to accountability and legitimacy with society. The identification and collection of these indicators may serve as a basis for evaluating the excellence of universities, as well as serving for a comparative evaluation between institutions. The scenario is quite broad and still imaginary, favorable for new research, but transparency in the management of public universities is fundamental. More research should be dedicated to understanding the role of the university and its contribution to social development.

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Author 5 - Collaboration in the revision of the final text.

DECLARATION OF CONFLICT OF INTEREST

The authors declare that there is no conflict of interest with this article.

APPENDIX A

Chart 3 - Proposed 3M indicators for Brazilian HEIs.

| INDEX | 3M INDICATOR | OBJECTIVE OR DIMENSION | PROCESS | INTELLECTUAL CAPITAL CH, CO or CS | REFERENCE |
|-------|--|------------------------------------|---|-----------------------------------|---|
| 1 | Number of employees involved in innovation creations and projects | Technology transfer and innovation | Intellectual property, spin-offs, and start-ups | Human capital | Adapted from Pausits et al. (2011) and Secundo et al. (2017). |
| 2 | Number of start-ups founded by employees and students of the Higher Education Institution (HEI) | Technology transfer and innovation | Intellectual property, spin-offs, and start-ups | Human capital | Adapted from Molas-Gallart et al. (2002); Pausits et al. (2011); Secundo et al. (2017) and Federal University of Santa Catarina (2020). |
| 3 | Number of spin-offs created by HEI students/staff | Technology transfer and innovation | Intellectual property, spin-offs, and start-ups | Human capital | Adapted from Molas-Gallart et al. (2002); Pausits et al. (2011); Secundo et al. (2017) and Federal University of Santa Catarina (2020). |
| 4 | Number of patent applications in force generated by the HEI | Technology transfer and innovation | Intellectual property, spin-offs, and start-ups | Organizational capital | Adapted from Molas-Gallart et al. (2002); Pausits et al. (2011); Secundo et al. (2017) and Federal University of Santa Catarina (2020). |
| 5 | Number of applications for protection required for other intellectual property assets generated by the HEI (trademarks, industrial designs, computer programs and cultivars) | Technology transfer and innovation | Intellectual property, spin-offs, and start-ups | Organizational capital | Adapted from Secundo et al. (2017) and Federal University of Santa Catarina (2020). |
| 6 | Number of protections transferred to company-companies via licensing | Technology transfer and innovation | Intellectual property, spin-offs, and start-ups | Organizational capital | Adapted from Molas-Gallart et al. (2002); Pausits et al. (2011); Secundo et al. (2017) and Federal University of Santa Catarina (2020). |
| 7 | Number of pre-incubated and incubated companies | Technology transfer and innovation | Intellectual property, spin-offs, and start-ups | Organizational capital | Adapted from Secundo et al. (2017) and Federal University of Santa Catarina (2020). |
| 8 | Number of prestigious innovation awards granted by companies and public sector associations or national and international funding agencies | Technology transfer and innovation | Intellectual property, spin-offs, and start-ups | Social Capital | Adapted from Pausits et al. (2011) and Secundo et al. (2017). |
| 9 | Number of products brought to market and based on technology licensed from the university | Technology transfer and innovation | Intellectual property, spin-offs, and start-ups | Social Capital | Adapted from Molas-Gallart et al. (2002). |

| INDEX | 3M INDICATOR | OBJECTIVE OR DIMENSION | PROCESS | INTELLECTUAL CAPITAL CH, CO or CS | REFERENCE |
|-------|---|------------------------------------|--|-----------------------------------|---|
| 10 | Number of joint publications with non-academic authors | Technology transfer and innovation | Research & Development (R&D) network development | Human capital | Adapted from Molas-Gallart et al. (2002); Pausits et al. (2011) and Secundo et al. (2017). |
| 11 | Number of laboratories or other research units, and buildings shared with the external community, being inside or outside the HEI | Technology transfer and innovation | Research & Development (R&D) network development | Organizational capital | Adapted from Molas-Gallart et al. (2002); Pausits et al. (2011); Secundo et al. (2017) and Federal University of Santa Catarina (2020). |
| 12 | Number of projects with international collaborators in joint R&D | Technology transfer and innovation | Research & Development (R&D) network development | Capital social | Adapted from Pausits et al. (2011) and Secundo et al. (2017). |
| 13 | Number of research projects with external co-funding | Technology transfer and innovation | Research & Development (R&D) network development | Capital social | Adapted from Molas-Gallart et al. (2002); Secundo et al. (2017) and Federal University of Santa Catarina (2020). |
| 14 | Number of staff involved with experience in launching start-ups and spin-offs | Continuing Education (CE) | CE for entrepreneurial competence | Human capital | Adapted from Molas-Gallart et al. (2002) and Secundo et al. (2017). |
| 15 | Percentage of teaching staff in CE programs | Continuing Education (CE) | CE for entrepreneurial competence | Human capital | Adapted from Secundo et al. (2017). |
| 16 | Number of courses that foster innovation and/or entrepreneurship in undergraduate and graduate programs | Continuing Education (CE) | CE for entrepreneurial competence | Organizational capital | Adapted from Federal University of Santa Catarina (2020). |
| 17 | Number of courses/events that foster innovation and/or entrepreneurship for the external community | Continuing Education (CE) | CE for entrepreneurial competence | Organizational capital | Adapted from Federal University of Santa Catarina (2020). |
| 18 | Number of corporate clients that co-finance the education of their employees | Continuing Education (CE) | CE for entrepreneurial competence | Social Capital | Adapted from Secundo et al. (2017). |
| 19 | Percentage of total new graduates | Continuing Education (CE) | CE for entrepreneurial competence | Social Capital | Adapted from Molas-Gallart et al. (2002) and Pausits et al. (2011). |
| 20 | satisfied with the knowledge and | Continuing Education (CE) | Talent attraction and incubation | Human capital | Adapted from Secundo et al. (2017). |

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|-------|--|---------------------------|--------------------------------------|-----------------------------------|--|
| 21 | and skill sets acquired through the course | Continuing Education (CE) | Talent attraction and incubation | Human capital | Adapted from Federal University of Santa Catarina (2020). |
| 22 | Number of HEI employees who participated in ongoing training courses | Continuing Education (CE) | Talent attraction and incubation | Human capital | Adapted from Federal University of Santa Catarina (2020). |
| 23 | Number of students connected through training events and workshops in the areas of innovation and entrepreneurship | Continuing Education (CE) | Talent attraction and incubation | Organizational capital | Adapted from Secundo et al. (2017). |
| 24 | Number of undergraduate students connected to junior enterprises | Continuing Education (CE) | Talent attraction and incubation | Organizational capital | Adapted from Federal University of Santa Catarina (2020). |
| 25 | Number of employees employed for talent attraction and incubation | Continuing Education (CE) | Talent attraction and incubation | Social Capital | Adapted from Secundo et al. (2017). |
| 26 | Number of events, fairs and workshops focusing on innovation, intellectual property, and entrepreneurship practice | Continuing Education (CE) | Talent attraction and incubation | Social Capital | Adapted from Federal University of Santa Catarina (2020). |
| 27 | Number of academic teams involved in volunteer consulting | Social Commitment | Social engagement with the community | Human capital | Adapted from Secundo et al. (2017). |
| 28 | Number of media appearances on public issues | Social Commitment | Social engagement with the community | Human capital | Adapted from Molas-Gallart et al. (2002) and Secundo et al. (2017). |
| 29 | Number of academic staff involved in regional planning | Social Commitment | Social engagement with the community | Human capital | Adapted from Secundo et al. (2017) and De La Torre, Agasisti; Perez-Esparrells (2017). |
| 30 | Number of external stakeholders (managers, politicians, manufacturers, etc.) involved in curriculum design | Social Commitment | Social engagement with the community | Human capital | Adapted from Secundo et al. (2017) and De La Torre, Agasisti; Perez-Esparrells (2017). |
| 31 | Number of undergraduates and postgraduates acting as interns in companies | Social Commitment | Social engagement with the community | Human capital | Adapted from Ramos-Vielba; Fernández-Esquinas; Espinosa-De-Los-Monteros (2010). |
| 32 | Number of enrolled students entering by affirmative action quotas* | Social Commitment | Social engagement with the community | Human capital | Adapted from Federal University of Santa Catarina (2020). |

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| 33 | Number of staff/students made available to provide services and facilities to the community (clinical services, hospital care, school pharmacy, legal advice, and others) | Social Commitment | Social engagement with the community | Human capital | Adapted from Carrión et al. (2012). |
| 34 | Number of events open to the community / public | Social Commitment | Social engagement with the community | Organizational capital | Adapted from Molas-Gallart et al. (2002); Pausits et al. (2011); Secundo et al. (2017) and Federal University of Santa Catarina (2020). |
| 35 | Number of research with direct community impact | Social Commitment | Social engagement with the community | Organizational capital | Adapted from Secundo et al. (2017). |
| 36 | Number of cultural centers (museums, historic sites) managed or co-managed by the HEI | Social Commitment | Social engagement with the community | Organizational capital | Adapted from Secundo et al. (2017). |
| 37 | Publicly accessible database of university experience | Social Commitment | Social engagement with the community | Organizational capital | Adapted from Hart; Northmore; Gerhardt (2009) and Federal University of Santa Catarina (2020). |
| 38 | Number of scholarships for permanence of students entering through affirmative action | Social Commitment | Social engagement with the community | Organizational capital | Adapted from Federal University of Santa Catarina (2020). |
| 39 | Number of health campaigns | Social Commitment | Social engagement with the community | Organizational capital | Adapted from Federal University of Santa Catarina (2020). |
| 40 | Number of attendances at the University Hospital: outpatient medical and multiprofessional consultations, emergency care, admissions, surgical procedures | Social Commitment | Social engagement with the community | Organizational capital | Adapted from Federal University of Santa Catarina (2020). |
| 41 | Number of partners (academic/non-academic) in non-income generating projects | Social Commitment | Social engagement with the community | Social Capital | Adapted from Secundo et al. (2017). |
| 42 | Number of institutions involved in formal agreements with the university | Social Commitment | Social engagement with the community | Social Capital | Adapted from Molas-Gallart et al. (2002); Pausits et al. (2011) and Secundo et al. (2017). |
| 43 | Number of start-ups by graduates | Social Commitment | Social engagement | Social Capital | Adapted from U-Multirank, (2021). |

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| | | | with the community | | |
| 44 | Number of graduates entering by affirmative action | Social Commitment | Social engagement with the community | Social Capital | Adapted from Federal University of Santa Catarina (2020). |
| 45 | Number of citizens attending workshops and scientific events | Social Commitment | Social engagement with the community | Social Capital | Adapted from Secundo et al. (2017) and Federal University of Santa Catarina (2020). |
| 46 | Number of faculty members who participated in scientific events abroad | Social Commitment | Internationalization | Human capital | Adapted from Secundo et al. (2017). |
| 47 | Percentage of faculty members who participated in exchange/mobility programs abroad | Social Commitment | Internationalization | Human capital | Adapted from Federal University of Santa Catarina (2020). |
| 48 | Number of scientific journals with university employees serving on editorial boards | Social Commitment | Internationalization | Organizational capital | Adapted from Secundo et al. (2017). |
| 49 | Number of joint publications with international authors | Social Commitment | Internationalization | Organizational capital | Adapted from Federal University of Santa Catarina (2020). |
| 50 | Number of cotutela agreements** signed with foreign institutions | Social Commitment | Internationalization | Organizational capital | Adapted from Secundo et al. (2017) and Federal University of Santa Catarina (2020). |
| 51 | Percentage of students who participated in exchange/mobility programs abroad | Social Commitment | Internationalization | Social Capital | Adapted from Molas-Gallart et al. (2002); Pausits et al. (2011) and Federal University of Santa Catarina (2020). |
| 52 | Number of students with international co-custody agreement | Social Commitment | Internationalization | Social Capital | Adapted from Secundo et al. (2017) and Federal University of Santa Catarina (2020). |

* Affirmative action is understood as actions that seek the inclusion of blacks (black and brown), indigenous people, people with disabilities or belonging to other socially vulnerable categories in the university environment.

** International cooperation modality that allows the *stricto sensu* graduate student to obtain, concomitantly, the title of Master or Doctor in two HEI (national and international).

Source: Own preparation adapted based on the references in the table.