THE ROLE OF HIGHER EDUCATION INSTITUTIONS IN DRIVING INNOVATION AND ENTREPRENEURSHIP FOR REGIONAL DEVELOPMENT

O PAPEL DAS INSTITUIÇÕES DE ENSINO SUPERIOR NA PROMOÇÃO DA INOVAÇÃO E EMPREENDEDORISMO PARA O DESENVOLVIMENTO REGIONAL

EL PAPEL DE LAS INSTITUCIONES DE EDUCACIÓN SUPERIOR EN LA PROMOCIÓN DE LA INNOVACIÓN Y EL EMPRENDIMIENTO PARA EL DESARROLLO REGIONAL

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ABSTRACT: This article examines the role of Higher Education Institutions (HEIs) in promoting innovation and entrepreneurship, focusing on their impact on regional development. The quantitative research was conducted in the western region of Santa Catarina, Brazil, using a five-point Likert scale questionnaire. Data collected from 468 respondents were analyzed using statistical tools to identify stakeholders' perceptions of HEI innovation and entrepreneurship activities and their relevance for regional growth. The findings demonstrate that HEIs play a central role in knowledge transfer, the creation of new businesses, and the development of partnerships with industry and government. The study suggests that HEIs can further enhance their impact through collaborative initiatives and increased engagement with regional innovation ecosystems. Limitations and future research directions are discussed at the end.

KEYWORDS: Innovation Ecosystems. Higher Education. Regional Economic Growth. Innovation. Entrepreneurship.

RESUMO*: Este artigo examina o papel das Instituições de Ensino Superior (IES) na promoção da inovação e do empreendedorismo, com foco em seu impacto no desenvolvimento regional. A pesquisa, de caráter quantitativo, foi realizada na região oeste de Santa Catarina, Brasil, utilizando um questionário baseado em uma escala Likert de cinco pontos. Os dados coletados de 468 respondentes foram analisados com ferramentas estatísticas para identificar as percepções dos stakeholders sobre as atividades de inovação e empreendedorismo das IES e sua relevância para o crescimento regional. Os resultados mostram que as IES desempenham um papel central na transferência de conhecimento, criação de novas empresas e desenvolvimento de parcerias com a indústria e o governo. O estudo sugere que as IES podem fortalecer ainda mais seu impacto por meio de iniciativas de colaboração e maior envolvimento com os ecossistemas regionais de inovação. Limitações e direções para futuras pesquisas são discutidas ao final.*

PALAVRAS-CHAVE*: Ecossistemas de Inovação. Educação Superior. Crescimento Econômico Regional. Inovação. Empreendedorismo.*

RESUMEN*: Este artículo examina el papel de las Instituciones de Educación Superior (IES) en la promoción de la innovación y el emprendimiento, con un enfoque en su impacto en el desarrollo regional. La investigación cuantitativa se realizó en la región occidental de Santa Catarina, Brasil, mediante un cuestionario basado en una escala Likert de cinco puntos. Los datos recopilados de 468 encuestados fueron analizados utilizando herramientas estadísticas para identificar las percepciones de los actores clave sobre las actividades de innovación y emprendimiento de las IES y su relevancia para el crecimiento regional. Los resultados muestran que las IES desempeñan un papel central en la transferencia de conocimiento, la creación de nuevas empresas y el desarrollo de asociaciones con la industria y el gobierno. El estudio sugiere que las IES pueden aumentar aún más su impacto mediante iniciativas colaborativas y un mayor compromiso con los ecosistemas regionales de innovación. Al final, se discuten las limitaciones y direcciones para futuras investigaciones.*

PALABRAS CLAVE*: Ecosistemas de Innovación. Educación Superior. Crecimiento Económico Regional. Innovación. Emprendimiento.*

Introduction

In discussions of regional and national development, the role of education emerges as a fundamental factor (Oyinlola *et al*., 2024). Education is the primary means through which humanity evolves, and without it, the continuity of civilization would be unattainable. It is a critical driver of both individual and societal development. In recent years, beyond its traditional role in teaching, Higher Education Institutions (HEIs) have increasingly assumed a pivotal role in fostering innovation and entrepreneurship, becoming key agents of regional economic and social development. HEIs generate and leverage knowledge to identify entrepreneurial opportunities, although evidence of this phenomenon remains fragmented and poorly structured (Guerrero; Urbano, 2010).

HEIs contribute not only to knowledge production but also to knowledge transfer (ESCAP, 2015). In several countries, including Brazil, universities have expanded their presence by generating knowledge that contributes to regional economies, thereby becoming essential actors in sustaining the respective accumulation processes (Hahn *et al*., 2024; Mathias *et al*., 2024).

Recognizing their role in local and regional development and responding to various stakeholder pressures, HEIs have expanded entrepreneurship education in recent years to better prepare students for the labor market. That is, the importance of disseminating an entrepreneurial culture within higher education institutions, to foster an entrepreneurial environment for future professionals, is fundamental (Schmidt; Paulus; Callegaro, 2021). Entrepreneurship and education represent two key opportunities that must be harnessed and interconnected to develop the human capital necessary to build future societies (Volkmann *et al*., 2009). Entrepreneurship fuels innovation, job creation, and economic and social growth (Schumpeter, 2021).

In the context of innovative universities, an entrepreneurial university becomes indispensable (Heaton, Siegel, Teece, 2019; Oyinlola *et al*., 2024). The dissemination of an entrepreneurial culture within higher education institutions, aimed at fostering an entrepreneurial environment for future professionals, is crucial (Al-Lawati; Abdul Kohar; Shahrin Suleiman, 2022). It is worth noting that innovation, as viewed by scholars (such as Bessant and Tidd, 2019; Schumpeter, 2021), can be analyzed not only as the creation of new products or services but also through the lens of new processes, positioning, or even novel worldviews.

Despite the extensive literature on innovation and entrepreneurship (Schmitz, 2017), few studies systematically consider these terms in tandem at both theoretical and empirical levels within the context of universities (e.g., Schmitz, 2017). This gap suggests the absence of a systemic view of innovation and entrepreneurship in the university context, particularly in understanding how universities contribute to regional socio-economic development. So, while entrepreneurial universities are widely recognized as key agents of regional economic and social development, given their ability to generate and exploit knowledge as entrepreneurial opportunities, evidence of this phenomenon remains fragmented and poorly structured. Moreover, although there are established standards in the literature regarding entrepreneurial universities, these characteristics tend to be generic, and regional variations are to be expected. Furthermore, the entrepreneurial university model is still emerging (Etzkowitz, 2004; 2016) - especially in Brazil — necessitating a more holistic view (Farsi; Imanipour; Salamzadeh, 2012).

In this scenario, this article aimed to evaluate the role of Higher Education Institutions (HEIs) in promoting innovation and entrepreneurship, as well as to analyze the perceptions of stakeholders regarding the importance of these activities for regional development. By exploring the intersection of education, entrepreneurship, and regional economic growth, this study seeks to bridge gaps in the existing literature, particularly in the context of Brazilian universities. This research contributes to the academic discourse by providing empirical evidence on how HEIs can act as drivers of regional development through entrepreneurial initiatives. Furthermore, it offers a deeper understanding of the challenges and opportunities involved in fostering an entrepreneurial culture within educational institutions, thereby aligning with the educational policy literature.

The Innovative University and the Role of the University

Innovative universities operate in complex and dynamic environments, with the ability to evolve through hybrid models and high levels of autonomy (Slaughter; Leslie, 1997). Clark (1998) introduced the concept of an innovative university based on a study of five European institutions. He found that to be considered innovative, a university must cultivate a culture that fosters innovation, adopt innovative practices, and tolerate risk.

An innovative university is characterized by scientific and educational activities driven by technological and innovative management principles. It operates within the education services market and in the broader intellectual, scientific, and consulting services sectors

(Berestova, 2009). Such universities must embrace change and innovation in education and research to improve their market position (Christina-Marta; Magdalena, 2009).

Etzkowitz and Klofsten (2005) identify four key norms of the innovative university: (i) knowledge capitalization; (ii) interdependence between industry, university, and government; (iii) institutional independence; and (iv) organizational hybridization to address inter/intra-dependencies. Galli and Teubal (1997 cited in Mineiro *et al.*, 2018) argue that universities are pivotal in innovation systems, responsible for training researchers and producing new knowledge. Universities must foster government and business relationships, identify research gaps, and lead change processes (Camboim, 2013).

In the innovation landscape, universities play a central role by developing competitive advantages through strategic capabilities in knowledge creation, dissemination, and technology transfer (Senhoras, 2012). Schumpeter's concept of creative destruction underscores the entrepreneur's role in driving economic development through innovation (Schumpeter, 2021). In higher education, this implies that universities must actively promote innovation and entrepreneurship as drivers of regional development (Gimenez; Bambini; Bonacelli, 2016).

Higher education institutions (HEIs) are essential actors in innovation systems, fulfilling their traditional role of training human resources while also creating favorable environments for innovation and entrepreneurship. They must ensure that the knowledge generated is leveraged for regional benefit, including the development of technology transfer mechanisms and collaboration with businesses and civil society (Etzkowitz; Zhou, 2017).

Universities are knowledge-driven institutions that exist to serve and contribute to societal development. Recent discourse on their role as innovation support structures is grounded in the paradigm shift from the Industrial Society to the Knowledge Society (Plonski, 1999). Universities are positioned at the heart of this transition, as they generate and disseminate knowledge (Etzkowitz; Leydesdorff, 2000). Day (1994) highlights the importance of learning in enhancing an organization’s competitive advantage, a concept supported by more recent studies (Frizzo; Gomes, 2017). Key elements in fostering university-driven innovation include relational structures within the ecosystem, the development of innovation competencies, access to venture capital, and the establishment of an internal innovation ecosystem (Ugnich *et al*., 2016).

Entrepreneurial University

The concept of an entrepreneurial university refers to institutions that proactively transform the knowledge they generate into added value, aligning with societal demands and acting as drivers of economic and social development (Otani, 2008). An entrepreneurial university integrates entrepreneurship into its core mission alongside teaching, research, and extension activities (Budyldina, 2018; Pugh *et al*., 2018).

There is no single definition of an entrepreneurial university in the literature (Lusena-Ezera; Rivza; Volkova, 2016), and its meaning varies depending on academic contexts. Etzkowitz (2004) highlights that entrepreneurial universities possess clear strategic directions, transforming academic knowledge into economic and social value. They foster innovation through intellectual capital, where students become potential entrepreneurs. Such institutions also provide an environment conducive to entrepreneurship and are key players in technology transfer and commercialization efforts (Leydesdorff; Meyer, 2014).

To succeed as entrepreneurial universities, institutions must engage with their regional environment, ensuring that generated knowledge benefits society and the economy. Centers for entrepreneurship, incubators, and innovation support structures are essential for fostering student entrepreneurship and supporting knowledge commercialization (Araujo; Davel, 2018). These universities emphasize not only innovation but also societal engagement through interdisciplinary approaches (Etzkowitz; Dzisah; Clouser, 2021).

Ultimately, entrepreneurial universities embody a dynamic model that integrates economic development as an academic function alongside teaching and research, promoting innovation and entrepreneurship as critical tools for societal transformation (Etzkowitz; Zhou, 2017).

Methodology

This research is quantitative, employing statistical tools and techniques to quantify opinions and information. It is a descriptive study, that aims to describe the characteristics of a population, sample, or phenomenon, establishing relationships between variables (Gil, 2019). The objective is to gather stakeholders' perceptions from higher education institutions (HEIs) located in the western region of Santa Catarina, Brazil. This region was chosen due to accessibility considerations.

A survey methodology was employed to collect data, using an online questionnaire administered through Google Forms. The survey method involves obtaining data or information on the characteristics or opinions of a target group. Google Forms enabled the easy collection and organization of data, which was stored in spreadsheets for analysis. The questionnaire comprised five sections, designed to capture respondent profiles, perceptions of innovation and entrepreneurship within HEIs, and the importance of these factors for regional development. A five-point Likert scale was used to measure responses, where 1 indicated the lowest level of agreement or importance and 5 the highest. The first section focused on demographics, such as age, education, and connection to the institution. The second and third sections assessed stakeholders' views on innovation, entrepreneurship, and regional development contributions, concerning Lopes (2012).

The data collection phase spanned from October 1, 2022, to November 30, 2022. Despite an initial focus on online responses, additional measures, such as phone calls, WhatsApp messages, and in-person meetings, were necessary to increase response rates. This strategy resulted in 600 distributed questionnaires. A non-probability convenience sampling method with a single cross-sectional cut was used, as described by Hair Jr. *et al*. (2005), providing a snapshot of opinions at a specific moment. The sample of 468 respondents was considered sufficient to ensure representativeness for the population under study.

Most respondents are up to 25 years old, accounting for 64.31% of respondents. As for gender, it is divided, with 44.01% male and 54.91% female. Regarding family income, a significant majority, 45.9%, falls within the range of 2 to 6 minimum wages. In terms of ethnicity, 83.33% of respondents are white, and in terms of education, 74.99% have incomplete higher education.

The data analysis was performed using SPSS Statistics 21 and AI tools. Missing data, outliers, and normality were checked, followed by descriptive and bivariate analyses. Descriptive statistics included means, standard deviations, and frequency distributions. This methodology ensures the reliability and validity of the findings, which offer important insights into the role of HEIs as catalysts for economic and social transformation through innovation and entrepreneurial activities.

Results

Table 1 provides a detailed comparative analysis of the perceptions of respondents regarding innovation and entrepreneurship activities in Higher Education Institutions (HEIs) and their perceived importance for regional development. The study focuses on various aspects such as training quality, technology transfer, partnerships, consultancy services, and research development, reflecting how these initiatives are viewed in terms of their role in supporting both institutional and regional goals.

Table 1 – Results comparing the respondents' perception of innovation and entrepreneurship (I&E) activities developed in the HEIs X and the importance of regional development

	Perception of I&E activities in HEIs		Perception of I&E activities in HEIs for regional development	
	Mean	Std. Deviation	Mean	Std. Deviation
Training of students with quality, establishing connections with practice.	4.2	0.9	4.58	0.806
Offering courses outside traditional programs, especially for members of industry, commerce, and the community.	3.63	1.122	4.31	1.038
Training individuals with superior quality, producing entrepreneurs and not just workers.	3.82	1.165	4.33	0.981
Dissemination of knowledge through scientific articles, books, etc., after preserving intellectual property.	4.05	1.035	4.33	0.91
Obtaining patents or generating trade secrets to preserve university intellectual property creations.	3.46	1.215	4.03	1.095
Transfer of knowledge and technology to newly created or existing companies.	3.65	1.167	4.17	1.05
Consultancy services for companies to improve their operations, promote existing businesses.	3.55	1.224	4.12	1.077
Laboratory services for companies, such as testing, certifications, etc.	3.38	1.261	4.12	1.093
Services to communities to improve their performance through informal consultations, advice, public lectures.	4.04	1.045	4.29	0.979
Establish new companies through technology transfer and consultancy; create new companies that exploit IP at universities; and create companies from research results.	3.45	1.214	4.06	1.104
University venture funds, with own capital or partnerships; joint ventures.	3.24	1.259	3.98	1.112
Development of research through public and private contracts.	3.44	1.271	4.16	1.043
Development of research in partnership with industry and community.	3.58	1.245	4.18	1.049
Maintenance or participation in business and social incubators to create enterprises.	3.28	1.305	4.05	1.084
Maintenance or participation in science and technology parks to conduct research and development and create new enterprises.	3.37	1.257	4.04	1.129

Maintenance of technology/knowledge transfer/licensing offices to transfer knowledge and technology to new or existing companies.	3.35	1.227	4.05	1.105
Obtaining external resources for research development, scholarships, and specialized training courses.	3.75	1.196	4.23	1.041
Engagement in science, with externally funded investigation projects and specialized research.	3.46	1.256	4.14	1.094
Commercial use of research results.	3.45	1.268	4.02	1.112
Creation and maintenance of research groups as business units.	3.36	1.259	4.1	1.106
Programs or relationship offices to increase partnerships with industry, government, and communities.	3.46	1.238	4.18	1.101

Source: Research data.

Based on the results presented in Table 1 we can extract key understandings:

- **Training and Knowledge Dissemination:** Activities like "Training of students with quality, establishing connections with practice" have high mean scores for both - activities HEIs and regional development (4.2 and 4.58, respectively). This suggests that stakeholders perceive the quality of student training and its practical relevance as critical to both institutional success and regional development.

Also, the "Dissemination of knowledge through scientific articles, books, etc." also scored relatively high (4.05 and 4.33), reinforcing the role of HEIs in generating and sharing knowledge that can be applied in regional contexts.

- **Support for Entrepreneurship:** Training individuals with superior quality to become entrepreneurs, rather than just workers, also shows a strong positive perception (3.82 in HEIs and 4.33 for regional development). This highlights the contribution of HEIs in creating entrepreneurial talent, which is crucial for driving innovation and regional economic growth.

There is a need to point out that the establishment of new companies through technology transfer and consultancy received higher scores in the context of regional development (4.06) compared to HEI-focused activities (3.45). This suggests that stakeholders recognize the significant impact that university-led entrepreneurship has on the broader region, with new businesses potentially leading to job creation and economic dynamism.

- **Technology Transfer and Commercialization:** Activities involving technology transfer, and the commercialization of research results generally showed moderate but positive perceptions (around 3.65 for HEIs and 4.17 for regional development). This indicates that while these initiatives are valued, there may be room for improvement in how HEIs manage and facilitate technology transfer to maximize regional benefits.

The role of technology/knowledge transfer/licensing offices also aligns with this perception, with stakeholders attributing higher importance to these activities for regional development (4.05) than for HEIs (3.35), further demonstrating that regional growth benefits from these HEI initiatives.

- **Partnerships and External Engagement:** Development of research through partnerships with industry and the community is perceived as highly valuable for both HEIs and regional development, with scores of 3.58 and 4.18, respectively. This reflects the importance of collaboration between universities, industries, and communities in driving regional innovation ecosystems. Similarly, programs to enhance partnerships with government and industry were highly rated for regional development (4.18), emphasizing the need for HEIs to build robust external relationships to create sustainable regional impact.
- **Research and Funding:** Engagement in research with external funding shows a positive perception (3.46 for HEIs and 4.14 for regional development), suggesting that research activities are key to regional innovation when supported by adequate external resources. Moreover, obtaining external resources for research development and scholarships scored relatively high for both HEIs (3.75) and regional development (4.23), further reinforcing the role of funding in promoting innovation activities that benefit the region.

The data suggests that respondents strongly value the role of HEIs in promoting innovation and entrepreneurship, especially in the context of regional development. Activities related to training, technology transfer, and partnerships with industry and government are particularly recognized for their contribution to regional growth.

The analysis indicates that while HEIs are effectively fostering innovation, there is a higher perception of their activities' importance for regional development, highlighting the broader societal impact of their initiatives. To further strengthen their role, HEIs may consider enhancing their efforts in technology commercialization, venture creation, and collaboration with external stakeholders to maximize both institutional and regional benefits.

Discussion

The results provide critical insights into how respondents perceive the role of HEIs in promoting innovation and entrepreneurship, particularly in the context of regional development. These perceptions align with the theoretical frameworks on innovative and entrepreneurial universities, providing both theoretical and practical implications for understanding the transformative role of HEIs in the knowledge-based economy.

First, we would like to point out **HEIs as catalysts for knowledge dissemination and skill development.** The high mean values related to training students with quality and establishing connections with practice (4.2 for HEIs and 4.58 for regional development) and dissemination of knowledge through scientific articles and intellectual property protection (4.05 and 4.33) strongly support the idea that HEIs are fundamental in building a foundation for innovation. This is consistent with Clark's (1998) model of the innovative university, which emphasizes the importance of cultivating a culture that fosters knowledge creation and transfer. Furthermore, Berestova's (2009) observation that innovative universities must operate in intellectual and consulting sectors is reflected in these findings, as respondents perceive HEIs as critical nodes in knowledge exchange networks.

These results underscore the dual role of HEIs as both educators and knowledge producers, tasked not only with traditional academic instruction but also with the development of practical skills that prepare individuals for entrepreneurial and innovative careers. This finding is supported by Etzkowitz's Triple Helix model, which emphasizes that universities must actively integrate with industry and government to ensure that the knowledge they generate has broader socio-economic impacts.

The data also highlights the **importance of entrepreneurial activities** in HEIs, particularly their role in **creating new companies and transferring technology to industry** (mean of 4.06 for regional development). These findings directly connect to the concept of the entrepreneurial university introduced by Etzkowitz (2004; 2016) and later expanded by Klofsten *et al*. (2019). The entrepreneurial university is characterized by its strategic approach to transforming academic knowledge into economic and social value. The higher scores for regional development suggest that stakeholders believe that the application of academic knowledge through entrepreneurship is more valuable for regional growth than it is internally for the HEIs themselves.

This reinforces the role of universities in Schumpeter's (2021) theory of creative destruction, which posits that innovation-driven entrepreneurship is a key driver of economic

development. In this case, HEIs play a central role in nurturing entrepreneurial mindsets and providing the necessary resources, such as incubators and venture capital, that enable students and faculty to turn ideas into viable businesses.

The **transfer of knowledge and technology to newly created or existing companies** scored a mean of 4.17 for regional development, indicating that stakeholders recognize the importance of technology transfer in fostering regional innovation ecosystems. This ties into Etzkowitz and Leydesdorff's (2000) assertion that universities are crucial actors in the Knowledge Society, positioned at the intersection of academia, industry, and government to facilitate the flow of technology and expertise. The **interdependence between industry, university, and government** (as highlighted by Etzkowitz; Klofsten, 2005) is reflected in the high mean values for **collaborative research development and industry partnerships** (4.18 for regional development).

These findings suggest that HEIs are recognized not only as hubs of knowledge but also as **partners in regional economic strategies**, working alongside businesses and public authorities to foster innovation. The importance of maintaining offices of technology transfer/licensing (mean of 4.05 for regional development) further solidifies this connection, as such offices are vital for ensuring that innovations produced in HEIs have a direct path to commercialization and societal impact.

Also, the higher mean values attributed to regional development in several activities suggest that stakeholders perceive **HEIs as more impactful in regional contexts** than within the institution itself. This is particularly evident in areas such as consultancy services (4.12 for regional development) and laboratory services (4.12), where HEIs are seen as key contributors to improving local industry practices. This aligns with the Innovation Systems approach, which highlights universities as essential actors in the broader regional ecosystem, contributing not just to human capital development but also to technological and business innovation (Etzkowitz; Zhou, 2017; Mineiro *et al*., 2018).

These results also connect with the idea of organizational hybridization, as proposed by Etzkowitz and Klofsten (2005), which refers to the flexible structures that allow HEIs to address interdependencies between academia, government, and business. HEIs, in this sense, are not only sites of knowledge creation but also **spaces of economic and social intervention**, actively participating in regional development by leveraging their intellectual and scientific capital.

From a practical perspective, these results suggest that **HEIs need to strengthen their engagement with regional ecosystems** through policies and structures that facilitate

knowledge transfer and commercialization. Initiatives such as the creation of venture capital funds, incubators, and science parks are essential for translating academic research into tangible economic value. The lower perception of the university venture funds (mean of 3.24 for HEIs and 3.98 for regional development) indicates a gap that universities could address by developing more robust internal mechanisms to support entrepreneurial ventures.

Moreover, enhancing partnerships with industry and government (4.18 for regional development) can help ensure that the innovations produced within HEIs contribute directly to regional competitive advantages. This approach is essential in dynamic and complex environments, where innovation ecosystems depend on the close collaboration of multiple stakeholders to thrive (Slaughter; Leslie, 1997).

The discussion of the findings reinforces the theoretical framework that positions HEIs as central actors in innovation ecosystems, both as knowledge producers and as facilitators of economic growth. The higher perceived value of HEI activities for regional development suggests that these institutions play a transformative role in their communities, contributing to socio-economic growth by fostering innovation and entrepreneurship. Moving forward, it is critical for HEIs to expand their internal and external capacities to maximize their impact on regional development, further aligning their educational, research, and entrepreneurial activities with the demands of the Knowledge Society.

Final consideration

This study has provided empirical evidence on the crucial role of Higher Education Institutions (HEIs) in fostering innovation and entrepreneurship as drivers of regional development. Through the perspectives of various stakeholders in the western region of Santa Catarina, Brazil, the findings demonstrate that HEIs significantly contribute to knowledge transfer, creating new businesses, and strengthening partnerships between industry, government, and academia. These efforts are pivotal for enhancing regional economic and social growth.

The research highlights that HEIs not only act as knowledge generators but also as vital players in translating that knowledge into actionable entrepreneurial activities, creating a positive impact on local communities. However, despite their notable contributions, challenges remain in optimizing the dissemination and commercialization of knowledge, as well as in fostering deeper collaborations between universities and regional ecosystems.

A key observation from the study is that while HEIs are perceived as fundamental to regional development, there is still room to enhance their role in technology transfer and the commercialization of research outcomes. The stakeholders recognize the value of these activities for regional growth, yet the processes could be further strengthened to ensure that innovations generated within HEIs effectively contribute to the regional economy.

Additionally, it is essential to consider the influence of large companies on the local context and the knowledge transfer processes from universities. The presence of such companies, while often beneficial in terms of economic growth and resource allocation, can sometimes lead to the monopolization of academic output. This monopolization may restrict the equitable dissemination of university-generated knowledge, potentially limiting the development of local entrepreneurship and creating barriers to broader social and economic inclusivity. Future research should further explore how these dynamics affect the transfer of knowledge and entrepreneurial activities at the local level, ensuring that the benefits of innovation are shared more widely across diverse stakeholders.

In conclusion, while HEIs in the region have made significant strides in promoting innovation and entrepreneurship, there remains a need for continuous engagement with local industries, government, and smaller enterprises to further enhance regional innovation ecosystems. Addressing the monopolization of knowledge by larger corporations and promoting more inclusive innovation strategies will be essential for ensuring the long-term sustainability of entrepreneurial activities and for fostering a truly collaborative regional development model.

Limitations and further research directions

This study has several limitations that should be considered. First, using a non-probability convenience sampling method limits the generalizability of the findings, as the sample may not fully reflect the diversity of perceptions across different HEIs or regions. Additionally, the data was collected from a specific region, the western part of Santa Catarina, Brazil, which may possess unique socio-economic and institutional characteristics, limiting the broader applicability of the results to other contexts.

Another limitation is the study's cross-sectional nature, which only captures stakeholder perceptions at a single point in time. As HEI activities and regional initiatives evolve, these views may change. The reliance on self-reported data via online surveys also risks response bias, potentially leading to over- or underestimation of the impact of innovation and

entrepreneurship activities. Lastly, the study does not explore qualitative insights that could offer a deeper understanding of how HEIs influence regional development and their challenges in implementing innovation policies.

For future research, it would be valuable to explore how specific university-led innovation initiatives, such as incubators, technology parks, and entrepreneurship centers, contribute to the creation of sustainable regional innovation ecosystems. Given the growing importance of interdisciplinary approaches, future studies could investigate how HEIs foster collaboration between different academic disciplines and industries to address complex societal challenges, such as environmental sustainability, digital transformation, and social inequality. Additionally, understanding the role of HEIs in promoting inclusive innovation, particularly in underserved regions or marginalized communities, is an important area for further exploration, as it can shed light on how universities can drive equitable socio-economic development.

Finally, future research could focus on exploring the impact of digital technologies and globalization on the role of HEIs in promoting innovation and entrepreneurship. As universities increasingly operate in globalized and digitally connected environments, it would be important to understand how they adapt to these changes and leverage new technologies, such as artificial intelligence, big data, and digital platforms, to enhance their innovation capacity and entrepreneurial impact. Additionally, investigating how HEIs integrate global innovation networks with local and regional development objectives could offer insights into the global-local dynamics that influence the effectiveness of university-led innovation activities.

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