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SAMUEL FERREIRA DE MELLO

FROM CLASSROOM TO INNOVATION ECOSYSTEM: THE ROLE OF THE UNIVERSITY DRIVING CHANGE THROUGH TRANSFORMATIVE LEARNING

PORTO ALEGRE, 2024

SAMUEL FERREIRA DE MELLO

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Thesis presented as a partial requirement for obtaining the title of Doctor in Administration, by the Graduate Program in Administration at the University of Vale do Rio dos Sinos (UNISINOS).

Orientador: Prof. Dr. Bruno Anicet Bittencourt

Co-orientadora: Profa. Dra. Luciana Maines da Silva

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ABSTRACT

This study delves into the influential role of Innovation Ecosystems (IE) and the significant contribution of universities to these transformative environments. IE's potency lies in fostering information flow, resource transformation, and collaborative networks, yielding tangible outcomes for communities globally. The university emerges as a crucial actor in IE, playing a pivotal role in its functioning, management, and orchestration. Transformative education assumes a key position in reshaping mental models and fostering a paradigm shift. The research, adopting a qualitative approach through a case study of the MBA in Innovation Ecosystem with 19 participants, explores how universities' transformative learning experiences contribute to IE development. It investigates the multifaceted roles of universities in regional innovation, emphasizing leadership impact, diverse university roles, and professors' active engagement in nurturing innovation ecosystems. The study underscores ethical engagement and neutrality, highlighting the interconnectedness of universities, companies, government entities, and civil society within the innovation ecosystem. Strategic insights emphasize the necessity for universities to adopt entrepreneurial and transformative roles, addressing the overlooked role of students as active contributors. The relation between participant diversity and transformative learning underscores broader impacts on academic and career paths. The study concludes by presenting a practical framework outlining the university's central role in IE, serving as a knowledge source and collaboration hub for fostering sustainable regional development.

Key-words: Innovation Ecosystem, university’s role, transformative learning.

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1 INTRODUCTION

The interest involving Innovation Ecosystems (IE) is increasingly widespread, not only in academic studies (Gomes et al, 2018; Foguesatto et al., 2021) but in the development of various ecosystems in different places around the world, like Silicon Valley in the USA, Tel Aviv in Israel, Barcelona in Spain, Medellin in Colombia, Florianópolis in Brazil. This is because IEs can create a flow of information and resources so that ideas become a reality, contributing to greater cohesion among its actors, creating networks among them with a common objective, and generating results for its context.

The ecosystem metaphor starts from a premise where “organisms” support and collaborate so that they can work together. Thus, the combination of these actors, which can be universities, governments, corporations, investors, and foundations, among others, generally seeks to create value in an ecosystem, transforming new ideas into reality (Trischler, 2020).

Among the instances of Innovation Ecosystems, the renowned case of Silicon Valley in California stands out. In this geographic context, a compelling synergy emerges, featuring a convergence of technology-centric companies, particularly in close collaboration with universities, notably Stanford, and active governmental participation. This interaction builds support networks, knowledge, and the generation of new talents and innovations (Adner, 2006; Jackson, 2015, Autio & Thomas, 2014).

Based on this same scenario, the university stands out as an important constituent actor of the EI, thus being able to assume different roles, being active and fundamental for the operation, management, and even orchestration of an IE (Ferguson & Fernández, 2015; Jackson 2015; Heaton, Siegel & Teece, 2019; Thomas, Faccin & Asheim, 2020).

Universities are often seen as the key drivers of economic growth, as they produce research and educate students who go on to create new businesses and industries. After all, in addition to their original role in the generation and dissemination of knowledge, universities are actors in regional development through their relationships with the economic environment (Schaeffer, Fischer & Queiroz, 2018). Thus, from the advance of the entrepreneurial university concept (Etzkowitz & Leydesdorff, 1995) these began to integrate market-oriented initiatives into their

activities. Therefore, the academy plays a central role in innovation ecosystems, contributing with human capital, research, patents, and publications, and also in the development of new knowledge-intensive businesses (Schaeffer et. al, 2018).

In this way, several studies on the subject that encompass universities in IE emerge and highlight the different roles of the university in an innovation ecosystem, with emphasis on those by Heaton et al., (2019) which analyzes the role of universities, based on cases from the perspective of dynamic capabilities, and the work of Trippl, Sinozic & Smith (2015) who highlight the role of the university for regional development, providing a framework to analyze the contributions of universities to regional economic and social development in different contexts and the political institutions that sustain them.

In this way, universities are development hubs capable of generating growth impulses for the place where they are located, playing a fundamental role in boosting regional spaces by directing flows and providing greater articulation on a territorial scale. Universities, therefore, are multi-scalar, as they allow places to connect with the world at the same time that they are rooted locally and regionally and connected globally, with significant effects on the production and consumption circuits of the economy that have a multiplying effect. in spatial structures, especially in the cities in which they are located (Oliveira Júnior, 2014).

Universities, therefore, are responsible for conducting research, training students, and engaging with the broader community to share their knowledge and expertise. This process of knowledge creation and dissemination is essential for driving innovation and economic growth, serving as hubs for research and innovation, and generating new knowledge, technologies, and solutions that can drive economic progress (Mowery & Sampat, 2001).

However, these impacts often have both limitations and geographic differences. This results from the fact that they are linked to the particular structure and characteristics of each region, which can result in different actions by universities depending on the innovation ecosystem in which they are inserted (Cowan & Zinovyeva, 2013). It means the impacts mentioned often have limitations and vary depending on the geographic location. This variability is attributed to the distinctive structure and characteristics of each region, leading universities to take different actions based on the particular innovation ecosystem of the area they are situated in.

In this way, in more developed regions, there is generally a more direct action on the part of universities, focusing on technology transfer and even commercialization (Etzkowitz, Webster, Gebhardt & Terra, 2000) and in less developed regions the university has a role with less interaction with the other actors in the ecosystem, mainly for commercialization and technology transfer (Mello, Faccin & da Silva, 2021).

Therefore, concerning the role of universities, it can be seen that there is a change to a new role for the university, which is more active and proactive in pursuit of the country's development and regional development (Villani & Lechner, 2020; Cruz -Amarán; Guerrero & Hernández-Ruiz, 2020) in addition to being primary agents in an innovation system. This means that they lead economic development processes by offering services that allow companies to capitalize on the knowledge that crosses borders and, under certain conditions, universities have the potential to play a catalytic role in regional development through their engagement activities (Marques, Morgan & Healy, 2019).

Serra, Rolim, and Bastos (2018) explain that teaching, research, and knowledge transfer are, in fact, essential attributions of universities, which contribute to the accumulation of qualified human capital through university education, for the generation of innovations and new skills through the research carried out, and for the socioeconomic transformation of the regions through the transfer of knowledge produced intramurally to the various industrial segments.

However, it is still necessary for universities to get closer to local demands and become more engaged actors in their ecosystems. Therefore, there is a need for legal changes, including adaptations to legislation, cultural and structural aspects of institutions. The most significant changes, however, should be pedagogical. Teaching should not be limited to instrumental education, where practices are uncritical of the reality of the world. Instead, it should reside in a critical educational184 process that enables self-reflective awareness and openness to reality. Such a process facilitates the modernization of society (Rodrigues, 2006).

Even though universities have adopted an expanded view of education (inside and outside institutions), many universities still restrict their role to basic and non-translational teaching and research within a collaborative context, including industry and government, aimed at educating agents. based on development

supported by science and technology. So that the transfer of knowledge and skills goes from a static to a dynamic state (Ferguson & Fernández, 2015).

Garrity (2012) explains that education plays a crucial role in changing mental models and worldviews, making it possible to build a new paradigm. So, for there to be a transformative change, a transformative education is needed, which adapts to transdisciplinary, holistic, and complex approaches. This education would enable a new organizational action, through a change in rationality (Sterling, 2011; Blake, Sterling & Goodson, 2013), and in this challenge, transformative learning demonstrates itself as a pedagogical approach that contributes to changing the worldview, inferring at the deepest levels of knowledge.

Therefore, additional research and more studies in the field of ecosystems related to teaching and learning issues are necessary. Specifically, an examination of how universities structure their programs to collaboratively create knowledge with students. The focus is on understanding how universities provide opportunities for the generation or construction of knowledge and, in turn, how they can act as agents in transforming existing realities. In essence, a deeper investigation is needed into the ways universities engage with students in knowledge creation and how this engagement contributes to societal transformations.

Establishing a nexus between the university's role in reshaping learning within the realm of management and business can be achieved by integrating research and extension activities that incorporate enhanced student involvement. This approach complements the conventional teaching methods, rooted in diverse pedagogical strategies and methodologies. These methodologies serve not only to engage students actively but also to provoke critical examination of the subject matter, facilitate the organization of knowledge, and, most importantly, instigate the practical application of acquired knowledge (Muenchen & Delizoicov, 2014). This underscores the imperative of a holistic educational approach that transcends traditional teaching paradigms, emphasizing experiential learning and active student participation.

In this sense, transformative learning is needed for individuals to fundamentally change their beliefs, attitudes, and behaviors as a result of their learning experiences. It is a powerful tool for personal and societal change (Mezirow, 1978), and it is essential for driving innovation.

For Sterling (2011, p. 22), transformative learning “reaches our deepest levels of knowledge and meaning and, in doing so, influences our most immediate and

concrete levels of knowledge, perception, and action". Taylor (2007) states that it is associated with direct, personally engaging, and thought-provoking learning experiences.

Based on this logic, it is necessary to investigate how the theory of transformative learning can contribute, not only to education but to an innovation ecosystem. Thus, this work will seek to develop the thesis that activities involving transformative learning are capable of providing a transformation in the innovation ecosystem where the university is inserted.

So, there exists a noticeable gap in research that goes beyond traditional metrics such as the sheer number of patents generated, technology transfer, and commercialization when analyzing the role of universities in the innovation ecosystem, besides the fact that the majority of research in this area is conducted in developed countries, it is worth noting that an increasing number of studies on this topic are being carried out in emerging countries (Mignoni et al., 2023; Mello, Faccin & Da Silva, 2022; Thomas, Faccin & Asheim, 2019; Schaeffer, Fischer & Queiroz, 2018; Bittencourt, Zen & Dos Santos, 2020; Cruz-Amarán et al., 2020), highlighting the relevance of the university as a key actor in the innovation ecosystem in this reality.

The universities play a central role as sources of knowledge and agents of change, making it essential to understand how they contribute to the innovation ecosystem through teaching, research, and extension. Understanding how universities promote innovation is essential for driving development and social progress, enabling policymakers and other stakeholders to collaborate effectively in achieving these objectives. The European Universities Initiative outlines a research and innovation agenda, highlighting the importance of transformative learning for addressing societal challenges (European Commission, 2019).

A comprehensive exploration should extend to encompass the dimensions of teaching and extension activities. This entails adopting novel methodologies and diverse perspectives to scrutinize the university's contribution to innovation not only in terms of tangible outputs but also in terms of its educational and outreach initiatives.

Rather than exclusively adopting the Silicon Valley model as the benchmark, which tends to dominate discussions on innovation ecosystems, it is imperative to broaden our scope. Exploring alternative global regions, utilizing varied research

methodologies, constructing new analytical models, and elucidating the experiences of developing countries contribute to a richer understanding of the university's role in fostering innovation.

In particular, there is a need for research that paints a comprehensive picture of a university deeply embedded in its innovation ecosystem. This involves addressing social issues, extending beyond the traditional confines of technology-driven innovation. Kezar (2013) provides insights into organizational change within higher education institutions, offering strategies for supporting innovation and transformative learning. She emphasizes the importance of visionary leadership, collaborative decision-making processes, and the cultivation of a culture that values experimentation and continuous improvement (Kezar, 2013).

Boyer (1990) in this sense, delves into the importance of teaching and learning, as well as his advocacy for a broader understanding of scholarship that encompasses not only research but also teaching, service, and application of knowledge for societal benefit. The author argues the importance of diverse perspectives and methodologies aligns with the idea that innovation often emerges from interdisciplinary collaboration and engagement with diverse stakeholders (Boyer, 1990). So, examining how a university engages with its local community, addresses societal challenges, and contributes to social innovation represents a critical facet of understanding the holistic impact of universities in diverse innovation ecosystems.

Therefore, the university plays a critical role in transformative learning once they are centers of knowledge creation and dissemination, and they can be used as a catalyst for innovation besides creating an environment that fosters transformative learning and innovation by providing access to knowledge and resources, facilitating collaboration and networking, and promoting a culture of innovation, and also play a vital role in developing human capital by providing education and training opportunities that are essential for innovation.

Allied to this, this work used the theory of transformative learning supported by the different roles of the university in the innovation ecosystem Through a unique case study of the MBA in Innovation Ecosystem program offered by the Alliance for Innovation, a partnership between the three largest educational institutions in Porto Alegre, the capital city of the state of Rio Grande do Sul, Brazil.

The primary aim of this alliance is to foster collaboration among civil society, businesses, government entities, and academia, with the goal of cultivating an innovative and globally renowned city marked by impactful innovation and an enhanced quality of life for its residents. This endeavor involves nurturing talent, fostering skill development and positive attitudes, advancing scientific and technological knowledge, as well as facilitating connections and bolstering innovation ecosystems to contribute to societal development.

The collaboration among these universities seeks to bolster concerted efforts towards advancing the innovation ecosystem and promoting the development of Rio Grande do Sul's capital. Specifically, the initiative targets the transformation of Porto Alegre into a national benchmark for innovation and entrepreneurship, thereby strengthening local, national, and international linkages to drive social and economic progress. Key aspirations include positioning the city as a nucleus for generating technology-driven ventures and startups, attracting fresh investments, and retaining skilled individuals within the capital's innovation landscape.

Moreover, the initiative envisions progress in urban development initiatives, such as the creation of conducive urban spaces and incentives geared towards attracting innovative ventures and fresh investments. This entails fostering modern living, socializing, and working environments tailored to the needs of an evolving innovation ecosystem. (Curricular Pedagogical Project of the MBA in Innovation Ecosystem, 2019).

1.1 Research Problem

How does the university contribute to the innovation ecosystem through transformational learning experiences?

To elucidate the research question and based on the theoretical framework, the following research objectives were elaborated:

1.2 Main Objective

The main objective of this research is to analyze the university's contribution to the innovation ecosystem through transformative learning experiences.

1.3 Specific Objective

a) Analyze the university's participation process in the creation of an experiential learning experience;
b) Map the key elements of transformative learning;
c) Identify the various collaborative activities between the actors involved and the contributions to the innovation ecosystem;
d) Propose a theoretical-practical framework that delineates the university's roles in catalyzing the Innovation Ecosystem through transformative learning

1.4 Justification of the Study

This study, when dealing with subjects that involve the role of the university, based on the theory of transformative learning for the development of the Innovation Ecosystem, aims to bring some contributions both at an academic and social level, aiming to combine theoretical and practical aspects.

Thus, when carrying out research in the main scientific databases on the themes, it is possible to perceive that they, individually, are increasingly being researched in different contexts (Gomes et al., 2018; Yaghmaie & Vanhaverbeke, 2019, Foguesatto et al. 2020; Granstrand & Holgersson, 2020; Mello et al. 2021) and bringing innumerable results of the transformation of realities.

However, these studies address this issue from a static point of view, focused mainly on cases or the replication of cases from developed countries, analyzing the commercialization or transfer of technologies, having the university from the perspective of the entrepreneurial university, but not engaged for the transformation of realities in its ecosystem (Mello, Faccin & Silva, 2021).

Therefore, taking into account transformative learning can be another alternative for the university, which is an important and increasingly participatory actor in regional development (Trippl et al, 2015) to practice, develop, and/or boost its ecosystem.

It is still worth highlighting from the academic point of view since the first studies that dealt with ecosystems in the management area (Moore, 1993) advanced to innovation ecosystems (Adner, 2006) the construct has been evolving and adding a large number of works confirming its academic, economic and social importance,

gaining prominence as they seek to understand that innovation, perceived as a process or as a result, increasingly depends on a robust interaction dynamics between the various actors present in a context (Ritala & Gustafsson, 2018).

The term and the evolution of transformative learning theory were not initially linked to the great challenges of social transformation and the role of the university, since it essentially refers to a change in the student's perception and construction of meaning in an experience of learning so that he questions or reformulates his assumptions or habits of thought (Mezirow, 1978). However, currently, several researchers in different areas use the theory of transformative learning from personal transformation, social transformation, in educational environments, and community transformation (Yorks &; Marsick, 2000; Del Magro, Pozzebon & Schutel, 2020; Hunziker & Hofstetter, 2020).

By uniting these topics, we thus have the university's role, which is capable of uniting all the themes and working with them through research and in the forms of teaching and extension in an active role in transforming the context in which they operate. Besides the social relevance that this project can play, this research is also justified by the originality of its theme from a scientific point of view.

More specifically, the creation of the MBA course in an innovation ecosystem, based on the alliance for innovation *(aliança para inovação)*, which brings together the 3 largest universities in the metropolitan region of Porto Alegre (PUCRS, UFRGS e Unisinos) that together are taking on place leadership roles in their region. The course has been considered one of the strategic projects of Pacto Alegre. The Course addresses spaces that add infrastructure and institutional and cultural arrangements, which attract entrepreneurs and financial resources, constitute places that enhance the development of the knowledge society, and include, among others, scientific parks and technology, smart cities, innovation districts, and technology hubs. Furthermore, it explores the mechanisms that promote innovative ventures and support the development of nascent technology-based companies, which involve innovative businesses including business incubators, business accelerators, open workspaces, cooperatives, and open laboratories for prototyping products and processes (PPC, 2018).

A study that explores the role of the university in the innovation ecosystem through transformative learning can offer several managerial contributions, influencing practices and strategic decisions in higher education institutions and

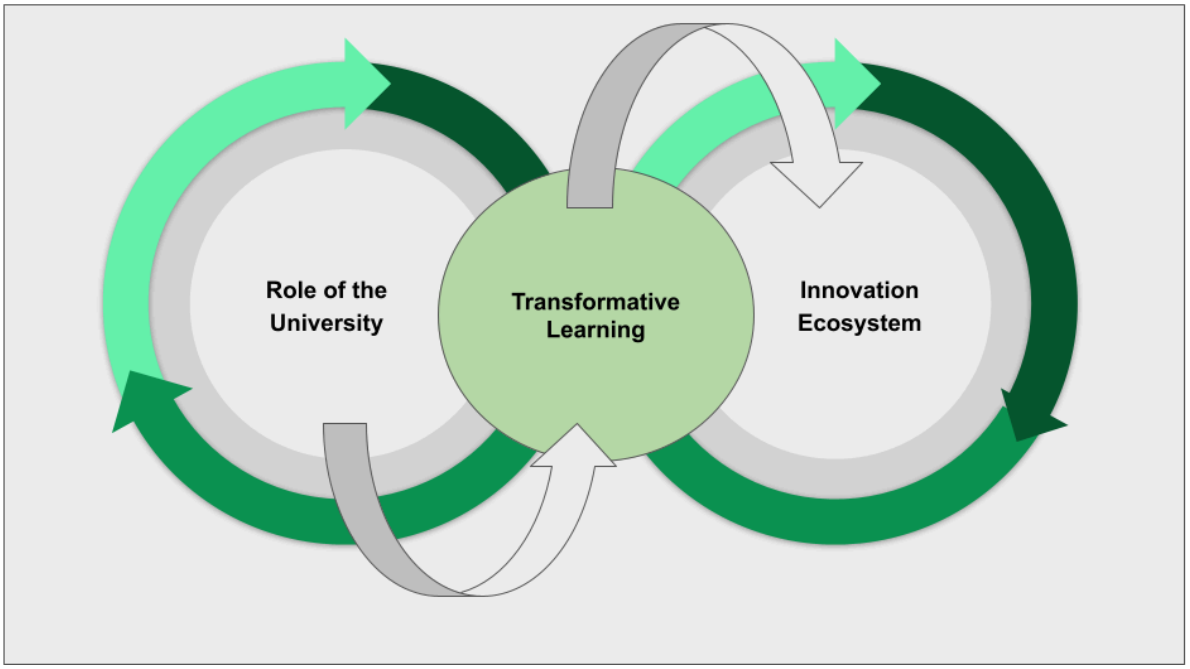
organizations involved in the ecosystem. Some potential managerial contributions include the Development of Innovative Educational Strategies (understanding how transformative learning occurs at the interface between the university and the innovation ecosystem can inform the development of innovative educational strategies), Promotion of Academic Entrepreneurship, management of Partnerships and Collaborations (The study can provide insights into the effective management of partnerships between the university, businesses, and government entities in the ecosystem), Assessment of Social Impact, Community Engagement, Development of Innovative Leadership and Measurement of Outcomes and Success Indicators.

These managerial contributions have the potential to positively impact how universities position themselves in the innovation ecosystem and how they manage their activities to promote transformative learning and innovation

In addition to this, there is a gap in the current literature relating to how innovation and regional development in emerging economies should best be promoted, and more specifically to what role universities can play in such efforts (Thomas, Faccin, Asheim, 2021).

So this study, as can be seen in Figure 1, will focus on the role of the university, through a transformative learning approach that can contribute to the innovation ecosystem.

Figure 1 - Constructs of the study



Source: created by the author

Overall, this study aims to contribute to the growing body of literature on the nexus between education, innovation, and societal change. By highlighting the transformative potential of universities and exploring practical strategies for leveraging transformative learning to drive innovation.

1.5 Structure of the Study

The initial section of this research introduces its topics, addressing the problem, objectives, and justification while highlighting their significance and contributions to the field. The subsequent part delves into the primary theories supporting the concepts applied in the research and anticipates its future outcomes. The third chapter outlines the methods designated for evidence collection and analysis. Essentially, the structure begins with a literature review on the topics, followed by a section detailing the methods, elucidating the steps and techniques crucial to achieving the research objectives.

Moving forward, the fourth section unveils the results, commencing with a comprehensive presentation that elucidates and contextualizes the analyzed case. Subsequently, the collected evidence is explicated and analyzed through both theoretical and empirical lenses, aiming to deepen the exploration of theories and expand the field's knowledge. This phase involves chapters dedicated to describing the evidence and scrutinizing it through theoretical frameworks, while also identifying potential drivers for transformative learning through the role of the university in the innovation ecosystem.

Ultimately, the concluding chapter encapsulates the study, offering final remarks that weave interpretations and theory into a conclusive summary for the current juncture.

2 THEORETICAL REVIEW

In this chapter, the main theories used to base the work and its main concepts will be addressed.

2.1 The Innovation Ecosystem

Introduced in the academic field in the 1990s, the concept of “ecosystem” has been present in the management literature from different perspectives. By illustrating a metaphor that describes a range of values capable of creating interactions and relationships between sets of organizations that are interconnected (Autio & Thomas, 2014), the concept becomes applicable to a variety of contexts other than its initial application in systems biology. After all, as it is a broad and versatile metaphor, its ability to elucidate interdependencies between organizations for the co-creation of value (Autio & Thomas, 2014) attracts the attention of academics.

Thus, the theme involving innovation ecosystems became widespread in both academic and applied discussions in the management area (Adner, 2016). The construct, therefore, has been increasingly used in different contexts, whether in academia or in business, and coming from different disciplines, it has emerged as a dominant concept in recent academic discourse in the field of innovation management (Ozer & Zhang, 2015; Adner & Kapoor, 2016). During the last 15 years, the Innovation Ecosystems literature has become increasingly popular and has seen great growth in the strategy, innovation, and entrepreneurship literature with a set of definitions and concepts in a variety of contexts. (Granstrand & Holgersson, 2019; Gomes et.al, 2016; Oh et al., 2016).

Therefore, the Innovation Ecosystem (IE) theme is becoming increasingly popular in the industry, government, and also in academia, in addition to receiving great attention for the creation of studies and models that aim to create and capture value, bringing a valuable discussion on economic development. In this way, the notion of ecosystems has raised awareness and focused attention on new models of creating and capturing value (Adner, 2016).

This analogy with the ecosystem in the area of management is introduced in studies by Moore (1993), who for the author, in management studies, these ecological aspects are related to the interdependence between the different actors and to the co-evolution that unites them throughout time. Thus, Moore proposes that

organizations should be considered not as isolated units, but rather as an integral part of a business ecosystem, which involves a series of actors. In this ecosystem, companies evolve together around innovation, producing both competitively and cooperatively in order to generate innovation (Moore, 1993).

With the advancement of his studies, the author presents that, as a biological ecosystem that includes living organisms interacting with each other and with the environment, a business ecosystem involves all individuals, organizations, and government entities, with which an organization relates (Moore, 1996). Looking at the innovation process from an ecological perspective emphasizes driving forces such as resource niches and adaptation, as well as dynamic evolutionary processes such as variation and selection (Durst & Poutanen, 2013).

Since the first studies by Moore (1993) that deal with business ecosystems advancing to innovation ecosystems (Adner, 2006), the construct has been evolving and adding a large number of studies to ratify its academic, economic, and social importance, gaining prominence in the as they seek to understand that innovation, perceived as a process or as a result, increasingly depends on a robust interaction dynamics between the various actors present in a context (Ritala & Gustafsson, 2018).

However, as it is a relatively new area, there are still some variations regarding the use of the construct, definitions, and even suggestions for further studies so this analogy with biology does not have a clear definition and needs to be better explained (Valkokari, 2015). This use is not based on a consensus on the definition, scope, limits, or theoretical roots of the term (OH et al, 2016; Ritala & Almpanopoulou, 2017). The term innovation ecosystem is mentioned in some contexts such as Corporate innovation ecosystems (open innovation), Regional and national innovation ecosystems, Digital innovation ecosystems, innovation cities and districts, ecosystem-centric small and medium-sized high-tech companies, incubators and accelerators, and finally university-based ecosystems (OH et al, 2016). Thus, a lack of theoretical consistency in the terminology of the innovation ecosystem can intensify the nebulous scenario of the research, which can lead to very fragmented and diversified theories, making it difficult to compare studies and failing to guarantee the consolidation of knowledge (Gomes et.al, 2016).

Within the field of studies that comprise ecosystems, IE stands out for an increase in scientific production in the last 15 years (Granstrand & Holgersson, 2020)

with a substantial increase in the last 5 years. This considerable increase brought with it the debate of identifying and conceptualizing a concept that addressed its relevance and necessary conceptual rigor. In this way, several authors and journals have addressed the task of defining an IE based on different approaches and contexts (Gomes et al., 2018; Granstrand & Holgersson, 2020).

The literature and studies comprising the EI concept in the last 15 years typically had their focus and origin on business and strategies (Gomes et al., 2018). Despite its broad concept and descriptions present in the academic field, there is a limited consensus among researchers in the area about what would actually be and would make up an IE (Baiyere, 2018). In this way, the concept of EI has gone from a broad metaphor to a contested concept, which calls for a conceptualization worthy of its complexity (Granstrand & Holgersson, 2020).

A relevant conceptualization of the IE was presented by Adner in 2006. At the time, the author defined an IE as being the collaborative arrangements through which companies combine their individual offers into a solution that is coherent and focused on the customer (Adner, 2006). Soon, supported by technologies capable of drastic cost reductions, IE ended up becoming a central element in the growth and development strategies of firms. Thus, according to Adner (2006), when this type of ecosystem works, it allows companies to jointly create value that it would not be possible to create alone. Adner's definition may remain today as the most used to conceptualize an IE (Granstrand & Holgersson, 2020).

With the increasing evolution of the field and its relevance in the construction of value by companies, several authors sought to identify the intrinsic characteristics of an EI, so that its definition could be correctly reached and expanded in the field of studies. Autio and Thomas (2014), went beyond the definition brought by Adner in 2006 when they determined an IE as a network of organizations that are interconnected but connected to a company or local platform, which in turn incorporates participants from the production and production sides. from use to the creation and appropriation of innovation values. In this way, the authors incorporate a larger and more complex range of elements into their definition, assuming that IE is necessarily organized around a focal point or shared asset (Autio & Thomas, 2014).

The question of the connection between the production and use sides of a focal company or platform addressed by Autio and Thomas can be seen in a focal company within its locality, as exposed by Teece in 2007, and Adner and Kapoor in

2010. Or still, it can be done through a company of the “hub” type (Moore, 1993). Or, finally, a shared technology platform (Gawer & Cusumano, 2002). It is precisely the explicit and deliberate inclusion of participants on the user side that differentiates an ecosystem from other management-centric constructs, such as industry clusters and networks, which generally tend to be more concentrated on the production side (Autio & Thomas, 2014).

Therefore, for Autio and Thomas (2014), the defining element of an innovation ecosystem would not be a product itself, but a set of interrelated technologies that is coherent, together with associated organizational competencies. These elements bring together a range of participants so that together they could co-produce offers for different layers of users. As such, it would be more helpful to reflect on IE as an evolving community.

In their study, Gomes et al. (2018) argue that the concept of innovation ecosystem emerged as a reaction to the capture of value and the competitive focus that predominated in the literature comprising business ecosystems, so the concept of EI places a greater emphasis on value creation and collaboration.

From another perspective, the prefix “eco” inserts into the notion of the system the dynamics of complex relationships that occur between the actors to create value, it is necessary to emphasize that in these relationships the elements of the environment cannot be forgotten, because without them this notion of the system closer to biological communities than ecosystems Adner, 2006; Jackson, 2011).

In the studies by Ritala and Almpanopoulou (2017), it is presented that the development of such axioms is of fundamental importance for studies in the field. We believe that by utilizing some of the useful features of ecological thinking (e.g. coevolution) and systems thinking (particularly complex adaptive systems), studies of innovation ecosystems can embrace their research objects more holistically and realistically.

In order to offer a set of original findings and respond to some criticisms in the management literature on the subject, Martins et. al (2020) present the biomimetic approach of biological ecosystems to the innovation ecosystem. In this study, the authors bring six lessons about EI, (1) An innovation ecosystem is formed by economic agents and relationships (biotic elements), in addition to non-economic parts, such as technology, knowledge, laws, culture, etc. (abiotic elements), (2) The boundary of an ecosystem is given geographically (physical space) and must include

the identification of different sets of actors (3): Resources flow through actors, reflecting the interdependence between actors, can build maintain or destroy the innovation ecosystem. (4) An innovation ecosystem evolves due to the relationships established by its actors (consumer resource, mutualism, competition), as these relationships select the actors that have the most favorable traits that allow them to better interact with each other and with the environment. create value. (5) Different stages of development of the innovation ecosystem can be evaluated according to the diversity of actors in an ecosystem. E (6): Innovation ecosystems can be created, but they need forms of governance, and also that organizations maintain a constant search for the best characteristics to guarantee their adaptation to the environment.

Within this context, Scaringella and Radziwon (2017) suggest that the literature related to the territorial approach would help to strengthen the foundation of the field of ecosystems, an approach that will guide this work. Thus Camboim (2018) explains the theme from the perspective “where” knowledge flows easily from a deliberate interaction and collaboration between different stakeholders (i.e., companies, government, S&T, institutions, and citizens), supported by a flexible institutional structure, an integrated-participatory governance model, an infrastructure and a functional urban design with diverse amenities and facilities to guarantee a high quality of life and a prosperous environment for creativity and innovation in the most sustainable way.

Camboim, Zawislak, and Pufal (2018) define a territorial innovation ecosystem as a complex ecosystem with an urban-environmental configuration, a socio-institutional structure, and a techno-economic dynamic that are governed by interconnected stakeholders, in order to create wealth through a comprehensive innovation process.

Through the various efforts made by authors and academics in the construction and definition of a concept that would substantially approach IE, together with all its important participants and elements, it is possible to observe that the concept has become increasingly complex and integral to different proportions and elements. It is from this perspective that encompasses the most different sets of elements belonging to an IE that the definition proposed by Granstrand and Holgersson in 2020 appears.

It was through an extensive literature review comprising the most diverse definitions of an IE since its emergence, that the authors were able to identify and

gather the common elements of each one to create a definition that sufficiently captured the complexity of the concept introduced in the 1990s. Thus, as mentioned earlier, the authors define an IE as the set of actors, activities, and artifacts in constant evolution, as well as the institutions and relationships – comprising both complementary and substitute relationships – that are fundamental to the innovative performance of an actor or a population of actors (Granstrand & Holgersson, 2020).

In this same study, the authors were able to identify that IE definitions usually focus on collaboration and ecosystem actors, with less emphasis being placed on substitutes, artifacts, and activities inherent to an IE. Hence the relevance of the definition presented by Granstrand and Holgersson, as it includes in greater detail and complexity the elements belonging to an IE. In their definition, an IE would include a system of actors with collaborative (complementary) and competitive (substitute) relationships, using or not a focal company, and also a system of artifacts (products, services, intangible and tangible resources) with complementary relationships and substitutes (Granstrand & Holgersson, 2020).

Oksanen and Hautamäki (2014) highlight in their work the importance of local actors, network interaction, dynamic processes, and an entrepreneurial risk culture for the success of the ecosystem and for local development. Likewise, Heaton; Siegel, and Teece (2019) point to the geographic nature of innovation, highlighting the university as an institution that generates key knowledge, along with a complete set of other agents, institutions, activities, activities, and cultures that support (or hinder) local innovation.

Based on a view of the territory, Serra, Rolim, and Bastos (2018) refer to Hirschman (1958) when explaining that regional economies are not miniaturized from national economies, since these have particularities that require specific analytical and theoretical efforts so that their development is stimulated and made possible. The complexity of the resulting regional transformations becomes even greater in an increasingly globalized and competitive world economy, in which the usual comparative advantages, based on natural resources, have increasingly lost relevance and gained prominence to the built and created advantages, whose basis is exactly in the differentiated capacity to generate knowledge and innovation.

Thus, it should be noted that regional development is not linked only to economic growth, but also to social, cultural, environmental, and political factors (Caiden & Caravantes, 1982). Thus, regional development can be understood as a

process of economic, social, and political transformation, whose dynamics are built from the place and with the active participation of its actors, being essential to the interaction between them (Siedenberg, 2006).

According to the OECD (2021), regional development is a broad term, but it can be seen as a general effort to reduce regional disparities by supporting (jobs and wealth generation) economic activities in regions. However, studies and perceptions regarding the construct have been changing, in that in the past, regional development policy tended to try to achieve these objectives through the development of large-scale infrastructure and the attraction of foreign investment, which currently studies are heading in another direction, more endogenous and with greater participation of local actors based on more effective use of public resources and significantly better policy outcomes.

This new approach is closely interrelated with participatory planning experiences and has the collateral objective of promoting the development of citizenship and the socio-political organization of communities (Haddad, 2018)

In these precepts, Dallabrida (2000) understands that the regional development process comprises the growing effort of local societies in the formulation of territorial policies in order to discuss central issues of contemporary complexity, which makes the region the subject of its development process. Thus, it is a process of sustained social change whose ultimate purpose is the permanent progress of the region, the regional community as a whole, and each individual residing therein (Boisier, 1996).

Boisier (2000) states that the development of a region or locality depends profoundly on its capacity for a social and political organization to shape its own future (endogenous development process), which is ultimately related to the availability of different forms of intangible capital (institutional, human, civic capital, social capital, synergistic capital, cognitive capital, and symbolic capital), in the region or locality.

Haddad (2018) highlights that regions do not develop without good governments, good institutions, and good endogeny. This behavioral balance between the commitment to scientific development and the expanded social responsibility of the universities' mission, in the process of their insertion in the regions where they are located. In this context, the roles of universities in the local

context with teaching, research, and extension activities stand out in order to support the promotion of regional development.

Chart 1 provides a summary of the Innovation Ecosystem construct discussed so far.

Chart 1- Aspects and Concepts of IE

Aspect/Concept	Description
Definition	- Collaborative arrangements through which companies combine their offers into coherent solutions focused on the customer (Adner, 2006). - Network of interconnected organizations around a focal point or shared asset (Autio & Thomas, 2014). - Set of actors, activities, artifacts, institutions, and relationships essential for innovative performance (Granstrand & Holgersson, 2020).
Characteristics	- Involves collaborative and competitive relationships (Autio & Thomas, 2014). - Includes economic and non-economic elements (Martins et al., 2020). - Geographically bounded (Camboim, 2018). - Involves the flow of resources among actors (Granstrand & Holgersson, 2020). - Evolves through relationships and interactions (Autio & Thomas, 2014). - Requires forms of governance and constant adaptation (Granstrand & Holgersson, 2020).
Key Elements	- Actors: Companies, government entities, local platforms, technology providers, etc. - Activities: Collaborative and competitive interactions, innovation processes. - Artifacts: Products, services, tangible and intangible resources (Autio & Thomas, 2014; Granstrand & Holgersson, 2020). - Institutions: Governance structures, rules, norms (Granstrand & Holgersson, 2020).
Importance	- Drives value creation and collaboration (Gomes et al., 2018). - Facilitates the creation of new innovation values (Adner, 2016). - Promotes economic development (Camboim, 2018). - Enhances regional development and social change (Boisier, 2000).

source: elaborated by the author based on the authors cited

These perspectives on innovation ecosystems draw from biological analogies, systems thinking, and territorial approaches, emphasizing the importance of collaboration, value creation, and endogenous development processes. As we delve into the role of universities within these ecosystems, it becomes clear how they can

contribute to regional development through their multifaceted roles in teaching, research, and social responsibility.

2.2 The role of the university in the innovation ecosystem

As well as the evolution in the field of study that comprises managerial ecosystems, the concept of the role of a university – be it within an ecosystem, or in society itself – has undergone a visible evolution over the years.

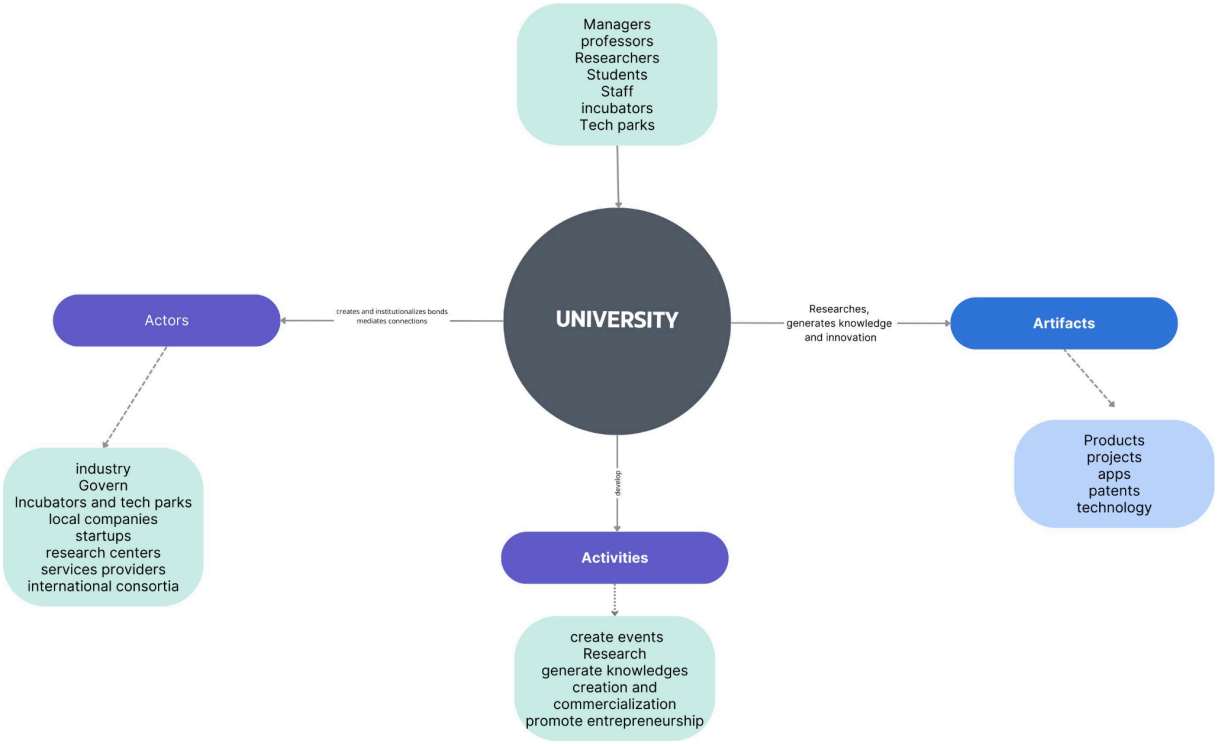
Originally conceived to transfer education to students and carry out basic research, universities had indirect benefits for the industry in their regions (Mowery et al., 2004). However, it is observed through the current literature that the role of the university is increasingly active and entrepreneurial, contributing to regional socioeconomic development (Hernández-Ruiz, 2020; Etzkowitz & Leydesdorff, 2000).

However, it is possible to see that universities are no longer so isolated in their territories and are becoming increasingly entrepreneurial, making partnerships and contacts with various stakeholders, and approaching and getting more directly involved in the environment in which they operate. Thus, universities are recognized as a particular type of public organization. In keeping with their traditional role of providing qualified staff to local companies and public organizations, they have been recognized as having a key role in the ecosystem in which they operate (Clarysse et al. 2014).

Although universities seek to fulfill broadly similar functions in different locations, their roles in knowledge transfer and innovation ecosystems can vary considerably in diverse institutional and structural contexts (Mowery and Sampat, 2006).

Thus, from the more active participation of the university in its ecosystem, figure 2 shows the university as an actor in an innovation ecosystem in a sharing relationship with the other actors in the ecosystem, developing activities, and generating artifacts.

Figure 2: The university in the innovation ecosystem



Source: Mello, Faccin & Da Silva, 2023.

Thus, the university plays an important role in the innovation ecosystem of which it is a part, relating and creating links with other actors, promoting numerous activities through teaching, research, and extension, in addition to generating artifacts from these activities.

An approach that makes the university increasingly active, especially when it comes to more active participation in the industry is the Entrepreneurial University (Etzkowitz, 1998). This role is recursive, remodeling the two traditional roles played by universities and transformers, repositioning universities as primary institutional spheres in economic regulation, alongside industry and the state (Etzkowitz & Leydesdorff, 2000).

The triple helix model (Etzkowitz and Leydesdorff, 2000) sharpened the focus on the role of universities in regional economies. This model conceptualized a non-linear and interactive approach to innovation as a recursive overlay of interactions and negotiations between universities, industry, and government - the three helices conceptualized in the model (Etzkowitz and Leydesdorff, 1997)

Therefore, universities can also be defined as institutions that shape research activities, creating the supply of qualified labor for the generation and dissemination of knowledge among socioeconomic systems (Etzkowitz & Leydesdorff, 2000). In this way, they act as participating agents in regional development through their direct and indirect contributions to productive structures (Mowery & Sampat, 2006).

They act as connectors, bridging generations and fostering collaboration among stakeholders. Additionally, they disseminate knowledge, enriching understanding within the region. Moreover, universities promote experiential learning within the ecosystem, ensuring accessibility for all. Proactively addressing emerging challenges, they utilize foresight and research to provide early-warning systems. Lastly, universities prepare future generations by guiding and coaching young individuals, equipping them with the necessary skills to navigate evolving landscapes (Markkula & Kune (2015).

The contributions provided by universities to society, therefore, go far beyond teaching activities (Schaeffer et al., 2018). The change of context evidenced in the 21st century, through scientific discoveries and technological advances, is accompanied by changes never seen before in the field of knowledge. Currently, the roles of the University in collaborating with companies, industries, and governments for the development and creation of skills in different economic and value contexts are recognized, and this role is even considered central in an EI (Ferguson & Fernández, 2015).

The university is a fundamental and active constituent element of EI and can assume different roles (Ferguson & Fernández, 2015; Heaton, Siegel & Teece, 2019), contributing with human capital, research, patents, and publications and also in the development of intensive new businesses in knowledge (Schaeffer et. Al, 2018). We see, therefore, an increasingly active university, through its role in scientific activity and patents, which corroborates its entrepreneurial character, with initiatives aimed at the market (Etzkowitz, 1998).

However, these impacts often have geographic limitations. This stems from the fact that they are linked to the structure and particular characteristics of each region, which can result in differentiated actions by universities depending on the innovation ecosystem in which they are inserted (Cowan & Zinovyeva, 2013).

It is also noticed the discrepancy in the role of the university regarding the socioeconomic environment in which it operates so that in more developed regions,

universities tend to present a greater insertion in innovation ecosystems. This is also reflected in the fact that most of the studies that analyze the role of universities are in developed countries and more structured innovation ecosystems.

Kohoutek et al. (2017) argue that there are three main types of universities operating in less developed regions, which are divided into (1) classical research-intensive universities, hosting a wide variety of departments and disciplines, offering to teach, and (mainly) basic research. Their emphasis on operation and on cutting-edge scientific and technological knowledge means they are less likely to become involved locally and choose to join international networks. (2) professional universities or colleges, offering to teach and mainly applied research, with strong local involvement with local government or industry. (3) Universities or professional colleges that have limited research capacity and focus primarily on teaching activities, including staff and student mobility, also tend to be locally involved.

Thomas, Faccin, and Asheim (2020) point out that, especially in countries where public administration lacks funding and resources to enable an innovation ecosystem that drives socioeconomic development, other actors, such as universities, can take the lead, since these countries there are several complex issues, such as its weak institutions, poverty, productivity deficits, corruption, limited capacities, among many other issues (Beer et al., 2019; Altenburg, 2009).

In these contexts, universities can play a local leadership role due to their neutrality, accumulated knowledge, and experience in relation to different stakeholder groups (Thomas, Faccin, and Asheim, 2020).

However, it should be noted that in regions with emerging economies, the participation of universities does not occur in the same way as in developed countries, since the structural, financial, and cultural aspects are very different.

When analyzing the literature on their role within an EI, it is seen that their performance is even more fundamental in developing countries (Cowan & Zinovyeva, 2013). In these countries, universities stand out as agents of great influence in the process of technological improvement (Jiao et al., 2016), which results from the low levels of innovative capabilities of companies, making the university a strategic source of information, knowledge, and innovation (Rapini et al., 2009).

The studies by Fischer, Guerrero, and Schaeffer (2020) addressed the dynamics of frugal innovation from the perspective of the Brazilian university Unicamp as an agent in knowledge transfer processes, emphasizing that universities

can play a central role in promoting inclusive development if they incorporate associated agendas to urgent social challenges.

Thomas et al (2020) argue that universities can motivate and empower regional stakeholders to reflect and act on the collective needs of regional development to accelerate the resolution of large-scale social problems.

In light of its changing role, the production of innovation outcomes in local contexts is increasingly explained in terms of university-industry collaboration and the academic role in entrepreneurship (Mercan & Goktas, 2011). This happens through the creation of science parks, startup incubators, access to research centers, and in some contexts, active participation in the company's governance. It is this approach that fuels the impulse of institutions to create spin-offs and monetize intellectual property through patents and knowledge licensing (Marques et al., 2019).

Chen and Lin (2016) explain how universities have this type of collaboration with companies so that they receive knowledge and technology from universities. Consequently, the main roles of most universities in emerging high-tech sectors are primarily as technology providers. This perspective shows that the role of universities is not only as providers of knowledge but also as developers who incubate technologies and potential products.

Thus, it is also worth emphasizing the widely known role of universities in seeking, evaluating, and sharing knowledge, which is fundamental to enabling its effective integration between organizations. This makes universities suitable actors that mediate the two main stakeholders, reducing cooperation problems and validating the effectiveness of the knowledge created for the project's objectives (Ardito et al., 2018).

Due to their high level of research activity and knowledge interactions with diverse actors, universities generally develop a high level of absorptive capacity. In this way, they are able to better evaluate different types of external knowledge than other actors directly involved, which also positively affects access to knowledge of local needs and social problems (Ardito et al., 2018).

Therefore, when we reflect on the role of universities, it is necessary to rethink it, since these are currently performing functions different from those they traditionally perform, however, several studies ratify their already established roles.

By thus linking universities to innovation ecosystems, Heaton et al. (2019) highlight that the role of the university in the local innovation ecosystem also depends

on the given stage of the innovation ecosystem. Thus, it can play a critical role in the birth and development of an ecosystem (Attour & Lazaric, 2018), in the creation and transfer of knowledge (Wu et al., 2017), or even in the commercialization of innovations (Kivimaa, et al, 2017).

In this context of changes, it is worth highlighting the role of the university in the IE as an actor provided with material resources and human capital. Therefore, the university has the potential to become a catalyst within the IE (Jackson, 2015), playing a key role in innovation ecosystems.

As mentioned earlier, in addition to their role in human capital development and technology enhancement, universities increasingly act as economic development partners with industries and local governments, such that they can function as ecosystem orchestrators through the application of their strategic intellectual capital. Therefore, universities can be identified as central actors in the growth or decline of their innovation ecosystems, in addition to being able to act as ecosystem integrators, performing various activities, and applying their intellectual, reputational, and financial capital to create and maintain a strong ecosystem. (Heaton, Siegel & Teece, 2019).

Consequently, among the various activities performed by the university in its various contexts, the literature has shown that in addition to its traditional duties, which involve the development of teaching, research, and extension activities (Cruz-Amarán et al., 2020), many other activities are developed by universities and often shared with other actors in the ecosystem (Chart 2).

Chart 2 - activities developed by universities

Activities	Authors
- Identify the lack and need for a functioning ecosystem; - Identify key regional stakeholders; - Motivate (convince) participation; - Lead the first activities until trust is built among the members and they commit to taking further actions; - Development of formal and informal relationships; - Collective definition of common objectives of knowledge absorption. - Manage the expectations of network members; - Clarify future benefits and overall outcome for the region; - Increase inter-organizational socialization and build multiple ties; - Keep members motivated; - Delegate responsibilities; - Monitor collective results; - Share administrative tasks; - Share administrative power.	Thomas *et al*. (2020)

- Involvement in technology transfer activities and application of research results to the business context; - Meetings and events to stimulate technology transfer activities, encouraging academic researchers to a more open approach, and communicating to local businessmen and institutions the intention to be more present in the region for joint activities.	Villani e Lechner (2020)
- Seek new sources of funding (revenue) by introducing activities related to the commercialization of innovation and technology transfer (new added value) through intermediary structures (channels).	Cruz-Amarán et al. (2020)
- Create science parks, start-up incubators, access to research centers, and in some contexts, active participation in the company's governance; - The translation of knowledge produced in higher education institutions into innovative products; - Sharing, engagement with companies and commercialization of innovation.	Marques et al. (2019)
- Identify local demand factors; - Build a science park, help launch new companies, provide incentives for chosen companies in a specific sector to locate there, and strengthen local institutions; - Orchestrate an ecosystem, attract companies, to apply intellectual, reputational and financial capital to establish and maintain a strong ecosystem; - Promote entrepreneurship by organizing programs such as boot camps for entrepreneurs, coaching, business plan competition.	Heaton et al. (2019)
- Product update, operation, and testing; - Offer training and articulate innovation needs with other actors; - Evaluation, prototyping and piloting, configuration, accreditation, and legitimation of innovation; - intermediate, negotiate a transaction; - Advice and management of rights and patents; - Direction, process management, business case creation, commercialization, evaluation of results.	Meng et al. (2018)

Source: Developed by the author based on the authors cited

As can be seen in Chart 2, universities carry out various activities as actors in an innovation ecosystem, ranging from the more traditional ones, such as teaching and research, knowledge production, to activities to create links with other actors, elaboration of events, creation of incubators and technology parks, creation or boosting of an ecosystem, even activities such as the commercialization of products and services developed.

Tolstykh, Gamidullaeva, and Shmeleva (2021) point out that the existing literature in the field of research is still inconclusive with regard to identifying the new roles and functions of universities in collaboration between the various actors in the processes of knowledge creation (Tolstykh, Gamidullaeva and Shmeleva, 2021). Still,

according to the authors, the university must change its role from a highly specialized university to an innovative university in the new economy. The aim of the university is to increase the amount of knowledge accumulated by the ecosystem, process and transfer the information into knowledge, and generate new information and knowledge. Thus, the influence of the university on other actors in the ecosystem is the transfer of knowledge along its chain.

With regard to the roles of universities, Tolstykh, Gamidullaeva and Shmeleva (2021) recognize that they are present: 1. Define and formulate a vision of the ecosystem as a whole; 2. Evaluate the role of each actor, predict the development of the ecosystem, and develop strategies; 3. Form a community of actors; 4. Find existing projects for inclusion in the ecosystem as subprojects in new cross-sectoral projects; 5. Integrate knowledge about technologies, skills, and best practices and take them to ecosystem actors; 6. Initiate new technology ideas and projects in the interest of ecosystem actors; 7. Provide ecosystem services to other communities.

The university creates the space for resources and actors to align more consistently and systematically as a means of addressing the issues of the society in which it is inserted, which can generate a great impact, since they function as key institutions, communicating with the actors in their ecosystem, providing innovation and sharing resources, knowledge, skills, cooperating and also exercising a leadership role (Tolstykh, Gamidullaeva and Shmeleva, 2021).

Therefore, it can be seen through the search in the literature on Innovation Ecosystems that there are still numerous differences in all aspects that involve Innovation Ecosystems according to the territory in which it is inserted, since its creation, the relationship between the actors, activities, and responsibilities, moments and phases in which they are as well as their objectives and results achieved. Chart 3, therefore, presents some more considerations in this regard, seeking to bring out these differences and relationships between them.

Chart 3 - The differences in the role of the university in Emerging and Developed countries

	Emerging countries	**Developed countries**
Actors	It is noted that there is a greater degree of connection and even dependence on the “government” actor in emerging countries.	In developed countries, on the other hand, it is noticed that the link between the university and the industry is stronger than in emerging countries. Although the

	Furthermore, the characteristics of universities in emerging countries vary greatly. Thus, the size of the institution, type (public, private, community), and location are factors that directly impact its role both in its core activities and in its ecosystem.	studies also emphasize the importance of the government in the creation of laws and public policies. However, greater interaction between the university and industry throughout the process, starting from targeted research as well as the commercialization of artifacts;
Activities	Identify the lack and need of an ecosystem; Identify key regional stakeholders (other actors); Seek new sources of funding (revenue) Motivate participation; Lead the first activities and development of relationships; Collective definition of common objectives of knowledge absorption. Delegate and share responsibilities; Promote entrepreneurship; Involvement in knowledge transfer activities; Create science parks, incubators, and access to research centers; Encourage the involvement of internal actors.	Involvement in technology transfer activities and application of research results to the business context; Incentive to researchers; Seek new sources of funding (revenue) by introducing activities related to the commercialization of innovation and technology transfer Create science parks, incubators, access to research centers and, in some contexts, an active participation in the company's governance; Promote entrepreneurship; Product update, operation and testing; Offer training and articulate innovation needs with other actors; Evaluation, prototyping and piloting, configuration, accreditation and legitimation of innovation; intermediate, negotiate a transaction; Greater stimulus to entrepreneurship in all training courses Greater interaction due to researchers consulting and directly with “practitioners”
Artifacts	Artifacts produced by universities are still very few in emerging countries, with the university playing a major supporting role, such as through scientific research and “help” in the creation of companies. Some artifacts that are produced by universities are still for “internal use” for research and prototypes, without the direct co-participation of other actors. Some (relevant) universities have linked technology parks and incubators. However, this number is still quite small.	In developed countries, there is greater participation of universities through partnerships with industries for the manufacture and commercialization of technologies and the generation of patents. So many products and services are produced by industry and universities at the same time. (one reason for this to be more easily developed is cultural issues and also issues of legislation since in countries like Brazil public universities need to comply with a series of bureaucratic issues, it is not possible to directly market products as well as make partnerships in a simple way. Licensing and spin-offs happen more often
Other considerations	The university must orchestrate, create, seek partnerships, develop, and show the need, as they are not so attractive to companies	It has greater power of attraction, due to a more direct relationship with companies. The university manages to have more of

	The university focuses more on the social aspect Research sources are basically coming from government agents does not have a specific department for a direct relationship with the industry. They still have few partnership and internationalization programs. The focus of research and extension is not so connected to the real needs of companies. The vast majority of universities are not business attractors, industries still attract companies more universities focus on creating a skilled “labor” Main actor for the creation of an ecosystem	internal and external investments, from different sources (sponsors) Various sources of research funding Most have technology transfer offices (TTOs) that aim to link university knowledge with industry needs. Cooperation programs between institutions and internationalization Industry-related research and development Universities as a promoter in the creation of companies and startups Universities attract new companies It is an actor involved in the orchestration

Source: Mello, Faccin and Da Silva (2022)

In chart 3, the depiction of the university's roles in different territories, shaped by economic, socio-cultural, and technological disparities, underscores the adaptive nature of educational institutions. This adaptability is particularly evident in emerging countries, where universities are increasingly assuming pivotal roles in missions related to teaching, research, and extension. Despite pronounced differences between emerging and developed countries, universities have demonstrated a remarkable ability to evolve and actively contribute to regional development, as noted by Trippl et al. (2015).

This adaptability and active participation of universities in diverse regional contexts align with the principles of transformative learning. Transformative learning theory, as proposed by scholars like Mezirow, suggests that individuals undergo a profound shift in their perspectives, beliefs, and actions through critical reflection and open dialogue. In the context of universities, this transformation is reflected in their ability to adapt and contribute meaningfully to regional development, acknowledging and responding to the unique economic, socio-cultural, and technological aspects of each territory.

The call for more research in the connection between universities and the theme of Innovation Ecosystems (IE) resonates with transformative learning. Transformative learning emphasizes a dynamic and evolving process, encouraging continuous inquiry and adaptation. Applying this lens to research on universities in IE, it becomes imperative to move beyond static perspectives, as highlighted by Heaton et al. (2019). A transformative learning approach in research would involve considering the dynamic characteristics of territories, understanding their historical contexts, and recognizing the evolving role of universities within these contexts.

Furthermore, the critique that many theories are primarily focused on developed countries, particularly those with well-established ecosystems like the United States, aligns with the transformative learning perspective (Mezirow, 2009). Transformative learning encourages a broad and inclusive understanding that takes into account diverse contexts and experiences (Mezirow & Taylor, 2011. In the context of IE research, applying transformative learning principles could involve exploring and acknowledging the unique challenges, opportunities, and transformative potential of universities in diverse global settings, including emerging countries.

In essence, the adaptability and active role of universities in regional development, especially in the context of emerging countries, align with the transformative learning theory's emphasis on continuous adaptation and profound shifts in understanding. Transformative learning principles can enrich research on universities in Innovation Ecosystems by encouraging a more dynamic and contextually aware approach, addressing the specific characteristics and historical contexts of different territories, fostering environments that encourage collaboration, challenge assumptions, and prioritize creative problem-solving.

Chart 4 provides a summary of the role of the university construct discussed so far in this work.

Chart 4 - Concepts and ideas on the role of the university

Concept/Idea	Authors/Contributors
Evolution of the university role	Mowery et al. (2004): "Originally conceived to transfer education to students and carry out basic research, universities had indirect benefits for the industry in their regions." Hernández-Ruiz (2020): "The role of the university is increasingly active and entrepreneurial, contributing to regional socioeconomic development." Etzkowitz & Leydesdorff (2000): "Universities are becoming increasingly entrepreneurial, making partnerships and contacts with various stakeholders." Clarysse et al. (2014): "Recognized as having a key role in the ecosystem in which they operate." Mowery and Sampat (2006): "Roles in knowledge transfer and innovation ecosystems can vary considerably." Etzkowitz (1998): "Role as an Entrepreneurial University, repositioning universities as primary institutional spheres in economic regulation."
University's roles in IE	Thomas et al. (2020): "Leadership role due to neutrality, accumulated knowledge, and experience." Villani e Lechner (2020): "Stimulate technology transfer activities, encouraging academic researchers and local businessmen." Cruz-Amarán et al. (2020): "Introducing activities related to commercialization of innovation and technology transfer." Marques et al. (2019): "Creation of science parks, startup incubators, access to research centers." Meng et al. (2018): "Activities ranging from product operation to commercialization."
University's activities in IE	Thomas et al. (2020): "Lead activities, define objectives, delegate responsibilities." Villani e Lechner (2020): "Stimulate technology transfer activities, encourage involvement." Cruz-Amarán et al. (2020): "Seek new funding, commercialize innovation." Marques et al. (2019): "Create science parks, incubators, engage with companies." Heaton et al. (2019): "Offer training, evaluate, negotiate transactions." Meng et al. (2018): "Direct process management, commercialization." Ardito et al. (2018): "Share administrative tasks, validate knowledge."
University's roles in emerging vs. developed countries	Mello, Faccin, and Da Silva (2022): Differences in university roles based on economic, socio-cultural, and technological disparities. Tolstykh, Gamidullaeva, and Shmeleva (2021): "Recognition of various roles including vision formulation, evaluation, community formation, and technology integration."

Source: created by the author based on the authors cited

In conclusion, the evolving role of universities within innovation ecosystems reflects a dynamic interplay between academia, industry, and government, as highlighted by a multitude of scholars. From their traditional functions of education and research, universities have transitioned into active contributors to regional development, fostering entrepreneurship, and facilitating knowledge transfer. The diverse roles universities play, whether in emerging or developed countries, underscore their adaptability to varying socioeconomic contexts.

As we transition to exploring transformative learning theory in the next session, it becomes evident that the evolving nature of universities mirrors the principles of transformative learning, emphasizing continuous adaptation, critical reflection, and dynamic engagement with the changing needs of society. Through this lens, we delve deeper into how universities can serve as catalysts for innovation and agents of societal change, embodying the ethos of transformative learning in their multifaceted roles within innovation ecosystems

2.3 Transformative Learning

Learning to think for yourself, freeing yourself from conditioned assumptions about the world, about others, and about yourself, is crucial for the world of work, for citizenship, and for making moral decisions in a rapidly changing society (Closs and Antonello, 2013).

In this way, transformative learning addresses the intersection between the individual and the social, coexisting and equally important dimensions, since individuals are constituted in society (Cranton, 2006).

The educator Mezirow (1978) is seen as the forerunner scholar on the subject, where he refers to transformative learning as essentially a change in the perception and construction of meaning in a learning experience, in a way that he questions or reformulates his assumptions or habits of thought. Thus, he defines it as “the process of using a previous interpretation to construct a new or revised interpretation of the meaning of one's experience to guide future actions” (Mezirow, 1998, p. 190).

Transformative learning thus evolved from the concept of perspective transformation (Mezirow, 1978) into an established learning theory based on constructivist, humanist, and critical social theory concepts (Cranton & Taylor, 2007; Tisdell, 2012).

The transformative learning theory was influenced by the works of critical authors such as Paulo Freire and Jurgen Habermas. In this perspective, it is a practice that values the culture and knowledge of the students, seeking to develop critical evaluation and restlessness, seeking the true causality of social phenomena through the deep interpretation of the problems experienced, and critically assimilating reality (Freire, 1970).

For Sterling (2011, p. 22), transformative learning "reaches our deepest levels of knowledge and meaning and, in doing so, influences our most immediate and concrete levels of knowledge, perception and action". Taylor (2007) states that it is associated with direct, personally engaging, and thought-provoking learning experiences. Mezirow (2003, p. 58) defines it as

> [...] learning that transforms problematic frames of reference sets, fixed assumptions, and expectations (habits of mind, meaning, perspectives, mindsets) – to make them more inclusive, discriminatory, open, reflective, and emotionally capable of change" (Mezirow, 2003, p. 58).

Mezirow (1981) described some key features of this learning, focusing on learning processes (how people learn), outcomes (what they learn), and conditions (how best to support their learning).

Thus, the transformative learning process involves ten phases of a shift in perspective, all of which can be experienced in random order and not all of which need to be experienced. They are: 1) Occurrence of a disorienting dilemma; 2) Carrying out a self-examination of assumptions; 3) Critical reflection on assumptions; 4) Recognition of dissatisfaction; 5) Exploration of alternatives; 6) Action plan; 7) Acquisition of new knowledge; 8) Trying out new roles; 9) Building skills; and 10) Reintegration into society from a new perspective, the fruit of the transforming learning experience (Mezirow, 1991).

"Learning outcomes" refer to what people can do and think at the end of the learning period, i.e. it refers to the outcomes of the learning process. And about learning conditions, Mezirow (1994) states that a student must have the ability to evaluate arguments objectively, opportunities for participation, accurate information, must be open to alternative perspectives, be free from coercion, and be able to reflect critically.

Reflective practice, according to Hedberg (2009), involves thinking about the experience, questioning, probing, analyzing, and synthesizing elements of what happened, and thinking about what could or should have happened, in order to understand more deeply the connections and interaction between things. For Cunliffe (2009), critical reflexivity strives to deeply question the underlying assumptions that shape our context and actively reflect on the meaning of lived experience.

Hicks (2002, p. 102), building on the work of Rogers (1994), suggests that the truly effective teaching and learning process must involve “three awakenings – of the mind, heart, and soul”. Rogers suggests that learning must involve the cognitive dimension (intellect); the affective dimension (emotions); the existential dimension (questioning their values, lifestyles, and their existence); the dimension of empowerment (sense of responsibility, commitment, and direction); and an action dimension (developing informed choices at personal, social and political levels).

Sterling (2011) uses a conceptualization of Bateson (1972), which distinguished three orders of learning and change, related to increased learning ability. First-order change refers to doing “more of the same,” that is, changing within specific limits and without examining or changing the assumptions or values that inform what one is doing or thinking. The second-order change relates to a significant change in thinking or what one is doing as a result of examining assumptions and values. And the third level of learning, which can be called epistemic learning, involves a change in epistemology or in the operative way of knowing, thinking, and interacting with the world, according to transformative learning.

In this logic, Fear et. al. (2006) points out that critical thinking and reflection are essential requirements for transforming learning to occur, but they are not sufficient in themselves unless they result in a transforming, sustainable, and responsible action. Calleja (2014) adds, stating that individuals cannot remain in pure reflection. They must plan actions, explore new relationships or roles, test solutions and integrate them into their lives.

It is in this perspective that a transformative education is necessary, rather than a transmissive one, in order to prepare individuals capable of facing complex sustainability challenges. Freire (1996, p. 25) already stated: "to teach is not to transfer knowledge but to create the possibilities for the production or construction of knowledge”.

Freire distinguishes two learning approaches: “banking” model of education, based on a specialized model of knowledge transmission centered on the teacher, in which students are understood as empty deposits to be filled with contents that are exclusively the teacher's domain and problematizing or liberating education, in which the student and the teacher work together, exploring reality, with dialogue as a key process for social praxis committed to transforming action, contributing to the emancipation of the subject (Menezes & Santiago, 2014).

It is clear that transformative learning is a challenge for the individual, but it is also a challenge for the system as a whole, in a context of dominant educational paradigms and structures that are essentially not transformed or critically reflective enough. Therefore, transformative education challenges prevailing norms in teaching and learning policies and practices (Stertling, 2011).

Noy, Capetola and Patrick (2021) argue that systems thinking approaches such as transformative learning help students to see interconnectedness and complexity where not before and to develop openness to multiple perspectives that facilitate interdisciplinary collaboration and contribute to transformative learning.

Transformative learning stands as a pivotal force for leaders seeking to transcend the confines of mere informational and behavioral single-loop learning. Its essence lies in catalyzing the conversion of strategies, goals, and guiding intentions, elevating the learning process to the realm of "double-loop" intricacies (Argyris & Schon, 1996). In this advanced paradigm, leaders not only absorb new information but critically reflect on their own behavior, identifying how their actions may contribute to existing challenges. The hallmark of transformative learning is the proactive alteration of one's behavior, a process akin to double-loop learning (Cummings & Worley, 2014). This dynamic and introspective approach encapsulates the very essence of transformative learning, as leaders engage in a continuous cycle of critical reflection, adaptation, and evolution.

Thus, the core of transformative learning is a process of critical and reflective questioning about our own actions and beliefs, leading to a fundamental change in how we see ourselves and the world. In countless situations, transformative learning can be seen as a pedagogy of discomfort, which emphasizes the need for educators and students to step out of their "comfort zones", challenging dominant beliefs, social habits, and normative practices to create individual and social possibilities of transformation (Zemblylas & Macglynn, 2012).

In this sense, transformative learning is not merely an intellectual process, and individuals cannot remain in the pure reflection phase. They have to show action engagement by negotiating or exploring new relationships or roles, planning a course of action, testing solutions and integrating these solutions into their lives (Calleja, 2014).

Taylor (2008) suggests that Interactive group activities, as role-playing, feedback exchange, or case study analysis, can provide opportunities for this type of learning to happen. The relationships that develop between class members and the professor provide modeling experiences that mimic the counseling relationship, turning the classroom into a laboratory for the exploration of new insights and the reconstruction of worldviews. These relational ways of learning are transformational for the students and professor (Taylor, 2008).

Slavich & Zimbardo (2012) incorporate the six core methods of transformational teaching (TT) that are grounded in transformative learning theory (TLT) The six core methods or teaching strategies are as follows: (1) Establish a shared vision for the course. (2) Provide modeling and mastery experiences. (3) Intellectually challenge and encourage students. (4) Personalize attention and feedback. (5) Create experiential lessons that transcend the boundaries of the classroom. (6) Promote ample opportunities for preflection and reflection.

So students should receive not just instructional content but also have the chance to engage with and contemplate the concepts being presented. Classrooms must be “stages upon which life-changing experiences can occur” (Slavich & Zimbardo, 2012, p. 6) in this sense Rogers (1980) suggests that Professors Embracing a transformative approach, educators are encouraged to abandon traditional teaching roles and instead, evolve into intellectual coaches or change agents, guiding students through dynamic learning experiences and fostering a profound impact on their cognitive development and adaptability in an ever-changing educational landscape, creating dynamic relationships in the classroom that give way to the personal and professional growth of students.

Transformative learning, according to Mezirow (2000), is a profound process that goes beyond the mere acquisition of knowledge; it involves a fundamental shift in one's mental framework and worldview. This shift is not a

superficial change but a reevaluation of the very assumptions that underpin one's interpretations, beliefs, mental habits, and viewpoints.

In essence, transformative learning is a dynamic process that engages individuals in critically reflecting on the foundations of their thinking. It encourages them to question assumptions, challenge existing beliefs, and reassess habitual mental patterns. This process is not always comfortable; it can be disruptive and unsettling, especially when long-held beliefs are questioned. However, it is through this discomfort and critical reflection that transformative learning paves the way for profound personal and intellectual growth (Mezirow, 2006).

Conceptualizations of transformative learning encompass different individual and social purposes, such as autonomy, individuation, empowerment, ecological consciousness, social action, citizenship, and democracy and they can be applied in a diversity of contexts (Mezirow, 2003; Taylor, 2009). Research on transformative learning can be seen in many areas ranging from personal transformation to organizational change and includes intercultural learning, participatory processes, lifestyle, educational settings, and social, and community transformation (Mezirow and Taylor, 2009) and innovation ecosystems.

Within the university's multifaceted engagements encompassing disciplines taught, research initiatives, and extension activities, a holistic commitment to transformative learning emerges. Through these diverse avenues, the institution not only fosters the emancipation of its subjects but also actively contributes to the promotion and development of the broader ecosystem in which it operates. This comprehensive approach underscores the university's pivotal role in cultivating practices that transcend traditional boundaries and propel both individual growth and ecosystem resilience.

In this sense, transformative learning is a profound process where individuals critically reflect on their assumptions and beliefs, leading to a fundamental shift in worldview. Within universities, it involves fostering intellectual growth through teaching, research, and engagement activities. By encouraging questioning and challenging existing paradigms, transformative learning not only empowers individuals but also contributes to innovation

ecosystems by promoting creativity, resilience, and interdisciplinary collaboration.

Transformative learning encompasses various individual and social purposes, including autonomy, empowerment, ecological consciousness, social action, and citizenship. The university's holistic commitment to transformative learning not only fosters the emancipation of its subjects but also actively contributes to the promotion and development of the broader ecosystem in which it operates, transcending traditional boundaries and propelling both individual growth and ecosystem resilience.

Chart 5 presents a summary of the construct of Transformative Learning present in this study.

Chart 5 Concepts and ideas of Transformative Learning

Concept/Idea	Summary	Authors
Transformative Learning	Transformative learning emphasizes freeing oneself from conditioned assumptions about the world, others, and oneself, crucial for work, citizenship, and moral decision-making in a rapidly changing society. It involves a shift in perception and meaning construction, questioning or reformulating assumptions or habits of thought. Influenced by constructivist, humanist, and critical social theory concepts, it addresses the intersection between individual and social dimensions.	Closs & Antonello (2013), Cranton (2006), Mezirow (1978, 1998, 2003), Freire (1970, 1996), Taylor (2007), Sterling (2011), Hicks (2002), Bateson (1972), Fear et al. (2006), Calleja (2014), Rogers (1994, 1980), Slavich & Zimbardo (2012), Mezirow (2000, 2006), Taylor (2008, 2009)
Key Features of Transformative Learning	The transformative learning process involves ten phases: disorienting dilemma, self-examination of assumptions, critical reflection, recognition of dissatisfaction, exploration of alternatives, action plan, acquisition of new knowledge, trying out new roles, building skills, and reintegration into society from a new perspective. Learning outcomes refer to what individuals can do and think at the end of the learning period, while learning conditions entail various factors supporting learning.	Mezirow (1981, 1991, 1994)

Reflective Practice	Reflective practice involves thinking, questioning, probing, analyzing, and synthesizing elements of experience to understand connections and interactions deeply. Critical reflexivity entails questioning underlying assumptions shaping one's context and reflecting on the meaning of lived experience.	Hedberg (2009), Cunliffe (2009)
Dimensions of Learning	Effective teaching and learning encompass dimensions such as intellect, emotions, existential questioning, empowerment, and action. Transformative learning involves three orders of change: first-order (doing more of the same), second-order (significant change resulting from examining assumptions and values), and third-order (change in epistemology or operative way of knowing).	Hicks (2002), Sterling (2011), Freire (1996), Slavich & Zimbardo (2012)
Transformative Education	Transformative education emphasizes creating possibilities for knowledge construction rather than knowledge transfer, challenging students to explore reality through dialogue and contributing to their emancipation. It challenges prevailing norms in teaching and learning policies and practices, preparing individuals to face complex sustainability challenges.	Freire (1996), Sterling (2011), Noy et al. (2021)
Transformative Leadership	Transformative leadership goes beyond informational and behavioral learning, involving critical reflection, adaptation, and proactive alteration of behavior. It engages in a continuous cycle of critical reflection, adaptation, and evolution, fostering personal and professional growth.	Argyris & Schön (1996), Cummings & Worley (2014)
Education Inquiry	At the educational level, the questions posed are **why** (purpose and objectives, and philosophy), **for whom** (audience and learners), **what** (curriculum), how (learning approach and techniques) and **for which results** (outcomes and assessment system)	Rae, 2005a

Source: created by the author based on the authors cited

So, Transformative learning encompasses a multifaceted approach to education, emphasizing critical thinking, reflective practice, and the reevaluation of assumptions. It challenges individuals to break free from conditioned beliefs, fostering personal and intellectual growth. Through interactive group activities and transformative teaching strategies, students engage in profound learning experiences that go beyond mere acquisition of knowledge. As universities commit

to transformative learning, they not only empower individuals but also contribute to broader ecosystems, transcending traditional boundaries and promoting resilience.

This holistic approach underscores the pivotal role of universities in cultivating practices that foster innovation, interdisciplinary collaboration, and social transformation. Transitioning to the interconnection between the university, the innovation ecosystem, and transformative learning, we explore how these elements converge to shape a dynamic landscape of learning and development.

2.4 The interconnection between the university, the innovation ecosystem, and transformative learning

In today's landscape, the interconnection between universities, innovation ecosystems, and transformative learning has emerged as a critical catalyst for regional development and collective progress. As universities increasingly assume pivotal roles in fostering innovation and responding to the dynamic demands of society, their influence extends beyond traditional academic functions. Through strategic partnerships, regional outreach initiatives, and a commitment to transformative learning, universities can drive transformative change and shape innovation ecosystems. This study aims to explore the dynamic interplay between universities, innovation ecosystems, and transformative learning as a theoretical framework, as presented in Chart 6, examining how these elements work synergistically.

Chart 6: Theoretical Framework

Theoretical approaches used to develop the research framework		**key words**
Innovation Ecosystem	Camboim, Zawislak, and Pufal (2018) define territorial innovation ecosystem as a complex ecosystem with an environmental-urban configuration, a socio-institutional structure and a techno-economic dynamic that are governed by interconnected stakeholders, in order to create wealth through a process of comprehensive innovation. An IE would include a system of actors with collaborative (complementary) and competitive (substitute) relationships, using or not a focal company, and also a system of artifacts (products, services, intangible and tangible resources) also with complementary relationships and substitutes (Granstrand & Holgersson, 2020).	territory interconnected stakeholders create wealth actors activities artifacts

		value creation
Role of the university	A new role for the university is to be more active and proactive in pursuit of the country's development and regional development (Villani & Lechner, 2020; Cruz -Amarán; Guerrero & Hernández-Ruiz, 2020) in addition to being primary agents in an innovation system. This means that they lead economic development processes by offering services that allow companies to capitalize on the knowledge that crosses borders and, under certain conditions, universities have the potential to play a catalytic role in regional development through their engagement activities (Marques, Morgan & Healy, 2019). Teaching, research, and knowledge transfer are, in fact, essential attributions of universities, which contribute to the accumulation of qualified human capital through university education, for the generation of innovations and new skills through the research carried out, and also for the socioeconomic transformation of the regions through the transfer of knowledge produced intramurally to the various industrial segments (Serra, Rolim, and Bastos, 2018).	teaching research knowledge transfer Third mission catalytic role in regional development
Transformative learning	The process by which we transform our taken-for-granted frames of reference to make them more inclusive, discriminating, open, emotionally capable of change, and reflective so that they may generate beliefs and opinions that will prove more true or justified to guide action (Mezirow, 1991). The core of transformative learning is a process of critical and reflective questioning about our own actions and beliefs, leading to a fundamental change in how we see ourselves and the world. It emphasizes the need for educators and students to step out of their "comfort zones", challenging dominant beliefs, social habits, and normative practices to create individual and social possibilities of transformation (Zemblylas & Macglynn, 2012). In this sense, transformative learning is not merely an intellectual process, and individuals cannot remain in the pure reflection phase. They have to show action engagement by negotiating or exploring new relationships or roles, planning a course of action, testing solutions, and integrating these solutions into their lives (Calleja, 2014).	change critical and reflective questioning challenging beliefs action engagement Testing solutions

Source: elaborated by the author from the cited authors

The interconnection between the university, the innovation ecosystem, and transformative learning represents a fertile ground for understanding and promoting socio-economic development. It explores the university's role within a broader perspective of regional development, acknowledging the social and political impact through the formal integration of regional needs into university priorities, coordination of regional networks, and policy advice (Trippl et al., 2015).

In the landscape of regional outreach initiatives, universities emerge as pivotal agents guiding and shaping innovation ecosystems. Their leadership extends beyond traditional academic functions, allowing them to orchestrate the evolution of these ecosystems into environments fostering the creation and transfer of cutting-edge knowledge and transformative technologies. Actively engaging in initiatives that bridge academia and industry, universities contribute to the dynamic development of innovation ecosystems, facilitating the exchange of disruptive ideas and advancements (León, 2013; Thomas et al., 2020; Faccin et al., 2022).

Universities are assuming a progressively crucial role in fostering regional economic development and bolstering innovation initiatives (O'Reilly et al., 2019). Positioned as central actors in the generation and distribution of knowledge, universities play a pivotal role in responding to the evolving demands of the knowledge-based economy (Bejinaru, 2017). Their significance extends beyond traditional academic functions as they actively contribute to addressing contemporary challenges posed by the dynamic landscape of the knowledge economy (Faccin et al., 2022).

Arvanitis et al. (2020) argue that universities, playing crucial roles in the generation and dissemination of knowledge, are fundamental in shaping innovation ecosystems. They act not only as centers for research and development but also play a crucial role in the formation of highly qualified human capital, essential for the vitality and sustainability of ecosystems.

The foundation of ecosystem thinking, characterized by expanding an actor's capabilities and transferring knowledge for innovation collaboration (Adner, 2006), has a multifaceted impact on the innovation landscape. Innovation ecosystems elevate overall capacity and contribute to the enhanced innovation performance of individual participants (Pellikka and Ali-Vehmas 2018; Song 2016). These ecosystems also play a pivotal role in amplifying the collective innovation performance of the entire network (Talmar et al. 2018), acting as catalysts for innovation at both individual and systemic levels.

Transformative learning, as outlined by Mezirow (1991), emerges as a decisive factor in the university-innovation ecosystem interaction. This process goes beyond mere knowledge acquisition, involving a profound

reassessment of individual identities and perspectives on the world. Authors like Fisher-Yoshida et al. (2009) highlight the importance of the authenticity of the educational experience, emphasizing that transformative learning is more effective when organically integrated into the specific challenges and opportunities of the local context.

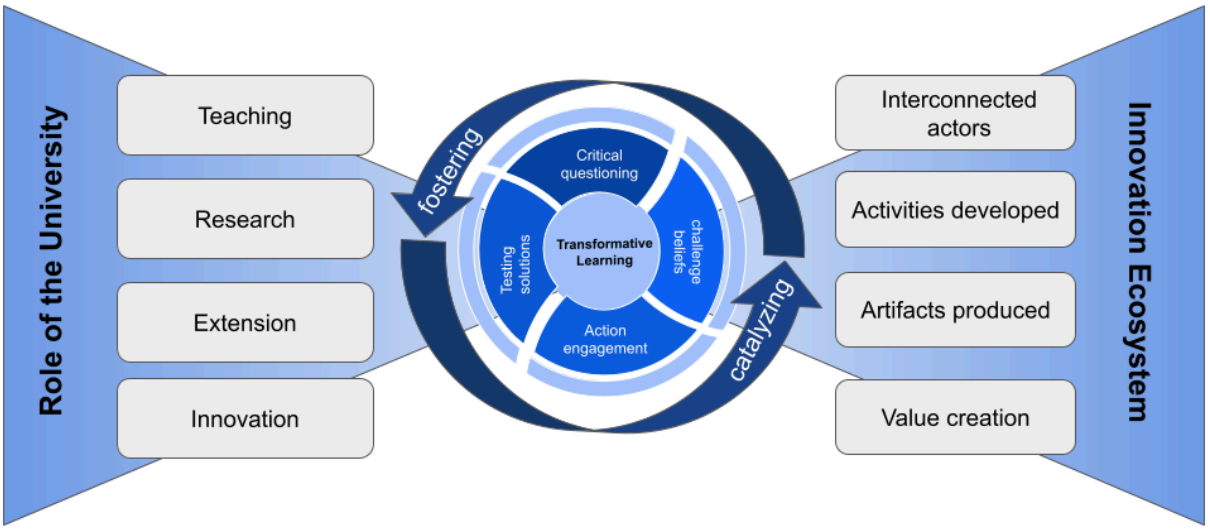
According to Nicolaides (2011), higher education institutions (HEIs) have an important role to play in regional contexts, striving to consider local development needs and support entrepreneurial education initiatives to meet socio-economic needs.

The university, adopting a proactive and committed stance to transformative learning, not only enriches the ecosystem with knowledge and skills but also instigates a culture of innovation. Acting as a catalyst, the university connects different actors and promotes a collaborative approach to solving complex challenges.

This study aims to develop the thesis that bringing these elements together results in a dynamic interplay where the knowledge generated within universities becomes a pivotal force within territorial IEs. Figure 2 shows this interplay among the framework used.

Universities contribute not only to economic development but also to transformative learning experiences that drive personal and collective change. Collaborative relationships within IEs find resonance in the collaborative and action-oriented nature of transformative learning. Both processes underscore the importance of dynamism, adaptability, and a proactive approach to challenges, creating a symbiotic relationship between regional development, innovation ecosystems, and transformative learning. This interconnectedness, Figure 3, establishes a holistic framework where the development of regions is not just an economic endeavor but a transformative journey involving individuals, institutions, and the broader community.

Figure 3 - Holistic Framework



Source: created by the author

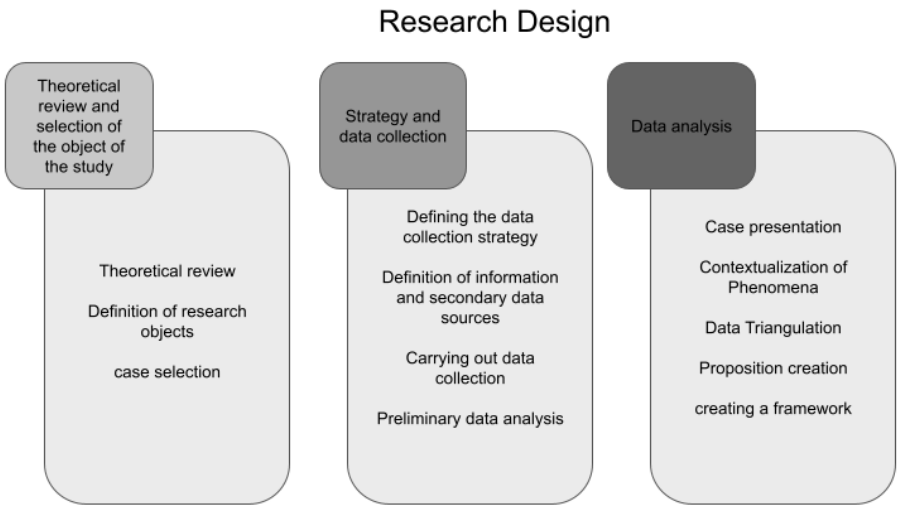
As central actors in the generation and dissemination of knowledge, universities play a crucial role in addressing contemporary challenges and shaping the innovation landscape. Through initiatives like transformative learning, universities enrich ecosystems with knowledge and skills, fostering a culture of innovation and collaboration. This study highlights the dynamic interplay between universities, innovation ecosystems, and transformative learning, showcasing their collective potential to drive personal and collective change.

3 RESEARCH METHOD

In this chapter, the method to be used for this research is described, and it represents, in summary, the steps proposed to achieve the objectives of this research. Richardson (2010) describes methodology as the rules and procedures used by a given method, emphasizing that the concepts of method and methodology are diverse; the first being characterized by the way or path to reach a certain end or objective.

In this way, this work aims to answer the main question: How does the university contribute to the innovation ecosystem through transformational learning experiences? For that, it was investigated along the literature in these areas to explore which methods can provide an answer to the question previously mentioned. Figure 4 presents the research design developed in this study.

Figure 4: Research Design



Source: Created by the author

Figure 4 shows the steps for this research, firstly, on a theoretical review and case selection, a data collection based on interviews and documents. and lastly, the data analysis using content analysis to detail the phenomenon and further the understanding of it. The details of the methodological choice are presented below.

3.1 Research Design

Qualitative research has been a suitable method to many studies in many areas of science, and especially when dealing with subjective themes or new thematics that explore deeper emerging issues. Also, analyzing the evidence gathered from qualitative research, it is required a different approach, and content analysis is a viable option that seems to provide the necessary structure to results analysis without constraining the evidence.

This thesis will be based on a single case study, using content analysis to investigate how the university can contribute to the innovation ecosystem through transformative learning. Single cases are straightforward and are chosen because they are unusually revelatory, extreme examples or opportunities for unusual research access (Yin, 2003) that can reveal in-depth information about the phenomenon studied

The case study is described by the author as an empirical investigation carried out in a given real context. The author presents the case study as a method that ranges from the planning logic, data collection technique, and approach specificity to analysis, also describing four conditions that give quality to the project, namely: construct validity, internal validity, external validity and reliability (Yin, 2003). Therefore, this research was carried out through a case study, as it allows an in-depth and detailed investigation to analyze how the key questions proposed here achieve the proposed objectives of the research.

The research design involves planning, through analysis and interpretation carried out based on data collection, considering the environment where the data is collected and its forms of analysis (Gil, 1999). The data approach in this research is guided by the use of a qualitative method.

Yin (2005) states that the case study is a definitive strategy for situations in which the researcher has little control over events when the focus is on a natural and contemporary context. Even though the case study sometimes seeks information in the past, through memories and documents to understand the current situation. The study can be complete, and should therefore seek to understand the before and during, with a scientific and documentary theoretical basis.

The use of documentation, according to Yin (2005), is an important source of data that can provide information that corroborates other data acquired through other

sources. The importance of documentation lies in the time it can reliably report, standing as a testimony of what it was like in the past and what it is like today.

Furthermore, interviews are a source of data where the researcher requests more targeted answers to the key themes of the research; a means of finding evidence for the case study that must be well constructed to bring out answers in accordance with the interviewee's reality and not directed by the interviewer (YIN, 2005).

The positivist method of developing theories based on determining configurations is used based on cases (Eisenhardt, 1989). Thus, the methodology consists of recognizing certain pre-stipulated patterns in accordance with the theory, searching for existing relationships within and between the cases analyzed (Eisenhardt, 1989), and enabling the identification of configurations for certain situations or results. The author suggests that the logic of replication in case studies is important, as each case serves as a small unit of analysis, but by working on them all it is possible to verify the relationships of replication, and contrast and serve the purposes of an emergence of new theories, including. However, social phenomena have a complex logic and are contextual, emphasizing the wealth of deep details of the real world in which that case occurs.

Following the logic proposed by Eisenhardt (1989), seeking to understand the problem of this research on how the university contributes to the innovation ecosystem through transformational learning experiences.

3.2 The case selected

The “*MBA* in Innovation Ecosystems” created and offered by the “aliança para a inovação”— Alliance to Innovation— combines the three biggest universities in the city of Porto Alegre, the capital of Rio Grande do Sul state, Brazil. The initiative in the southern part of the country was established in 2018 by the city's main universities—UFRGS (Universidade Federal do Rio Grande do Sul), PUCRS (Pontifical Catholic University of Rio Grande do Sul), and UNISINOS (Universidade do Vale do Rio dos Sinos)—. The main objective of the alliance was to engage civil society, business, government, and academia to support a more innovative and internationally recognized city characterized by high-impact innovation and a good quality of life for its citizens. train talents and develop skills and attitudes, advance

scientific and technological knowledge, connect and boost innovation ecosystems, and contribute to the development of society.

A coordination between these universities aims to enhance high-impact actions in favor of the advancement of the innovation ecosystem and development of the capital of Rio Grande do Sul. Objectively, the action focuses on transforming the city of Porto Alegre into a reference in the area of innovation and entrepreneurship in the country, enhancing local, national, and international connections, in favor of social and economic development. Transforming the city into a hub that generates new technology-based ventures and startups, attract new investments and retain talent in the capital's innovation ecosystem are some of the expected results. It is also projected advance in city structuring actions, such as the provision of adequate urban spaces and with incentives aimed at attracting innovative ventures and new investments, with modern spaces for living, living and working (Curricular Pedagogical Project of the MBA in Innovation Ecosystem, 2019)

The alliance seeks a future in which Porto Alegre is an international reference in innovation, culture and quality of life began to be outlined through Pacto Alegre, one of the Alliance for Innovation initiatives.

With this structure, the Alliance is committed to being a spokesperson for development and an agent in adding values capable of defining a vision of the future and recognized as a reference model for collaboration and innovation. In this sense, it invites the university community to engage through their respective skills and potential creators in areas of action capable of, methodologically, guaranteeing the success of the composition of an innovative space such as:

Research – supported by the production capacity of the three universities;

Training – guaranteed by excellence in teaching to be shared by member institutions;

Communication – capacity for scientific dissemination, exchange of knowledge and mobilization of the community to engage as an agent of innovation;

Environment – the exchange of consolidated innovation spaces of the three institutions, as reference centers and models of excellence for innovation actions;

Pact – the main and first product of the Alliance to integrate the municipal public administration sector of Porto Alegre as an agent of transformation, supported by the methodology and innovation expertise of the three higher education, research,

extension and innovation institutions. This Pact is called Pacto Alegre— Happy pact— an analogy to the name of the city Porto Alegre.

This is a union of efforts between representatives of universities, entities, public authorities and organized civil society, to put into practice projects that transform, in the medium term, the capital of Rio Grande do Sul into an environment favorable to investments, job creation and income.

Porto Alegre's innovation ecosystem, known as Pacto Alegre, had its origins in 2018 through a collaboration between the "Alliance for Innovation", made up of educational institutions and the local government. The primary objective was to involve civil society organizations, companies, the public sector and academia in promoting an innovative city, recognized globally as a model of innovation with great impact and a high quality of life for its citizens (Pacto Alegre, 2021).

The Pacto Alegre encompasses five interconnected dimensions that summarize the analysis of the city's innovation ecosystem, as described by Zen et al. (2019): Talents and Knowledge, Structural, Financial, Institutional-Legal, and Interaction and Quality of Life. In this representation, the city is conceived as an innovation ecosystem, having the capacity to train and attract talent, disseminate knowledge and count on institutional support, innovation capital, infrastructure, laws, norms and regulations that contribute to the quality of life of the population.

The ecosystem involves a diversity of actors, including creators, educational institutions, government, technology parks, financiers, media, and approximately 100 companies and institutions from different sectors (Pacto Alegre, 2021). This collaboration resulted in the construction of a value proposition for the ecosystem, aiming to position Porto Alegre as an international reference in innovation, urban, economic and social transformation (Pacto Alegre Oficial, 2021)

Attentive to the commitment to deliver concrete results for the society of Porto Alegre and Rio Grande do Sul, the different bodies that make up the Alliance for Innovation have developed important projects that have already had a positive impact on Porto Alegre and the State.

One of the results delivered was the MBA in Innovation Ecosystems, which came to reality from the collaboration of Universities, UFRGS, PUCRS and UNISINOS, in the design of a postgraduate course in Innovation Ecosystems

So, this study has the post-graduation course, called “MBA in Innovation Ecosystem” as a highlight of the analysis, which was an objective of the happy pact

and created in partnership with the three universities. In this sense, the MBA in Innovation Ecosystems is presented, which seeks to develop a global vision of innovation ecosystems. structured around seven axes: innovation contexts; immersions in innovation ecosystems; innovation; applied project; right; regulations and public policies; and innovative technologies.

The curriculum offered immersive experiences, aiming to transform Porto Alegre into a reference in the area of innovation and entrepreneurship by enhancing local, national and international connections. The MBA classes were taught by professors from the three universities. The Immersion in Innovation Ecosystems discipline was featured in classes at the three institutions, providing contact with the infrastructure, business models and people management of the ecosystems of the Universities that are part of the Alliance for Innovation.

The main goal of the course was to provide a global view on innovation ecosystems and present various aspects of innovation from different angles and perspectives, leading to an understanding of all ecosystem components, influences and potential impacts on the development of people, businesses, regions and countries.

As specific objectives:

- To explore the different types of innovation ecosystems and the means for their development, access and use to leverage innovation and different perspectives on innovation;

- Provide new insights regarding the boundaries, structure and management of innovation ecosystems, so that people, companies and organizations interact with each other, with the aim of developing projects, forming an environment for learning and innovative creation.

The essence of a case study is, therefore, the fact that it is a strategy for empirical research used to investigate a contemporary phenomenon, in its real context, enabling the explanation of causal links in singular situations (Yin,2005), the selected case is a reference case in the creation of an alliance to create an innovation ecosystem. These initiatives aimed to boost the innovation ecosystem, promote partnerships between public and private sectors, support startups and entrepreneurs, and create conditions conducive to sustainable economic development in the region.

In this context, through the Alliance for Innovation and the Pacto Alegre, the MBA in Innovation Ecosystems is justified as a unique case, as it addresses the spaces that unite infrastructure with institutional and cultural arrangements, attracting entrepreneurs and resources, constituting organizations that enhance the development of the knowledge society, in addition to offering a global view of new ecosystems and innovative aspects from different angles and perspectives, influencing the development of people, businesses, regions and countries.

The course also works with the construction and management of an innovation ecosystem. Another factor worth highlighting is that the course offered provides new insights into the boundaries, structures and management of these ecosystems so that people, companies and organizations interact and develop projects, creating an environment for learning and innovative creation. The curriculum also offers immersive experiences, aiming to transform the capital into a reference in the area of innovation and entrepreneurship, enhancing local, national and international connections.

3.3 Data collection and Data analysis

The researcher used the following data collection techniques: semi-structured interviews and the use of secondary data with written and online documents about the case selected. These documents were identified through research in databases of academic articles, as well as website news and histories disclosed from the organizations and companies involved in the process. Through reading from the first documents, other relevant sources were identified. The objective of this initial secondary data collection was to develop a greater understanding and knowledge of the case studied.

For this research, secondary and primary data were used. The secondary data (Chart 6) was collected from news, reports, articles and official documents that refer to the process of forming the Alliance for Innovation and all the consequences and all the deliberations that took place after its creation, it also analyzed the Pedagogical Course Project of “MBA” in Innovation Ecosystem, complemented with the YouTube channel that presents videos relating to its actions (Pacto Alegre Oficial, 2021).

Chart 6 - Secondary data

Documents	Programs of MBA course Porto Alegre's Innovation Ecosystem mapping Câmara municipal de Porto Alegre - CCJ meeting minute 13 pages of handwritten evidence
Youtube videos	https://www.youtube.com/c/PactoAlegreOficial https://www.youtube.com/watch?v=3y6deIhoZ4c https://www.youtube.com/watch?v=OonhvG4hfjY
Website access From- october 2023 - December 2023	https://www.acinh.com.br/noticia/alianca-para-inovacao-lanca-mba https://alianca.PUCRS.br/ https://pactoalegre.poa.br/ https://www.unisinos.br/noticias/tag/alianca-para-inovacao/ https://prefeitura.poa.br/taxonomy/term/3266 https://gauchazh.clicrbs.com.br/opiniao/noticia/2023/03/alianca-para-inovacao-cinco-anos-de-cooperacao-clfu7c7h5006v01515ks6t46w.html https://www.ufrgs.br/proir/alianca-para-inovacao-quatro-anos-um-beneficio-social/ https://www.camarapoa.rs.gov.br/draco/reunioes_de_comissoes/4749/1628099385.pdf

Source: Research data

The collection of primary data was organized to ensure comprehensive coverage and meaningful insights. The process began by defining a first group of interviewees, comprising stakeholders from the three educational institutions involved, including course developers and professors. Additionally, key actors from the innovation ecosystem of Porto Alegre were included in this initial phase. Interviews were conducted with this group until theoretical saturation was achieved, signifying that no further information was deemed necessary for a thorough understanding of the subject matter. Subsequently, interviews were initiated with the second group, consisting of students enrolled in the MBA course.

The interview questions were crafted to be broad and open-ended, allowing participants to articulate their perspectives freely. Supplementary questions were posed as needed to clarify any points of ambiguity or delve deeper into specific areas of interest.

A total of 19 interviews (Chart 7) were conducted between September and November 2023, involving individuals directly or indirectly associated with the course. These interviews were conducted online via video conferencing, meticulously recorded, and transcribed to yield a comprehensive dataset comprising 248 pages of transcription (Arial font, size 11, spacing 1.5). On average, each interview lasted approximately 35 minutes, ensuring ample time for participants to express their insights and experiences

Chart 7 - interviewees

Interviewee	Role in the course	Institution	Interview duration
I1	professor and administrative staff	Unisinos	48’
I2	professor and coordinator	Unisinos	52’
I3	professor	PUCRS / Alliance for innovation	32’
I4	professor	Unisinos/ Alliance for innovation	21’
I5	professor	UFRGS/ Alliance for innovation	41’
I6	professor and coordinator	Unisinos	42
I7	professor	UFRGS	41
I8	professor and proponent	Unisinos	39
I9	professor and coordinator	PUCRS	27
I10	professor	Unisinos	34
I11	administrative staff	Pacto Alegre	26
I12	student		31
I13	student		24
I14	student		32
I15	student		30
I16	student		48

I17	student		37
I18	student		31
I19	student		25

source: created by the author

In the presentation of the narrative, to preserve the identities and keep the anonymity, the names of the interviewees were omitted, being identified by the code “I xx”. Later, the interviews’ transcriptions and the documents were analyzed by this researcher. Using codification according to each of the categories described in Chart 4, excerpts were selected, representing the categories, whether to confirm or discredit the category. In qualitative research, the number of evidence is not relevant so much as it is the quality of the evidence collected. Therefore, after observing the excerpts from interviews and documents collected, these pieces of evidence were transformed into the final results for the analysis, in the search to achieve this study's main objective.

The data analysis was conducted ensuring that the insights derived were both comprehensive and insightful. The process began with the transcription of the recorded interviews, totaling 248 pages of qualitative data from the interviews. This involved a systematic approach to coding, categorizing, and interpreting the data, allowing for the extraction of meaningful findings. Codes were iteratively refined and organized into overarching themes, capturing the essence of the participants' perspectives and experiences.

The focus of the documentary analysis consisted to get information and comprehend the creation of the Alliance, *Pacto Alegre* and the *MBA* course in order to understand the specific contributions to the transformation of the actors involved and how it resonated in the innovation ecosystem

For data analysis, the content analysis method (Bardin, 2016) was used and as it is proposed by the actor the analysis involves several steps. Initially, it is necessary to carry out pre-analysis, which includes the organization and choice of material to be analyzed. Next, the material is explored, seeking to identify categories and recording units. The third stage is processing the results, which consists of grouping and interpreting the identified categories. Finally, interpretation occurs,

which seeks to extract meanings and conclusions from the results obtained (Bardin, 2016)

Content analysis is a technique that classifies the subjects into categories. The researcher analyzes the evidence gathered from different sources and unites the pieces into specific blocks of categories that may be defined before the evidence collection or may arise from the evidence collected. Following Bardin (2011), content analysis presents three steps:

- Pre-analysis: organize ideas on theories and decide how to categorize the evidence. First contact with documents, interviews, defining the corpus of analysis, formulating propositions or hypotheses, and creating categories that will help in the interpretation.
- Material exploration: codifying the evidence, classifying and aggregating them into categories, identifying keywords or expressions, uniting the evidence into registry entries, grouping them according to the categories.
- Results treatment and interpretation: consists in treating the evidence, interpreting the content, searching for the overlaying of aspects.

According to Bardin (2006), it is important to select documents (and interviews if that is the case) that have features such as: exhaustion - there is no more communication required to understand the topic; representativeness - documents and interviews represent the whole field of the research; homogeneity - evidence is from the same topic; and pertinence - the evidence speaks about the same research topic and problem.

We employed the content analysis method (Bardin, 2016) for data analysis. The organization adhered to the author's proposed structure. Using content analysis by Bardin (2016) involves some steps and considerations: 1) pre-analysis, 2) exploration of the material, and 3) treatment of results, inference and interpretation (Bardin, 2016). So in this work, we will use these steps according to the author and seek to organize them in the following way: Define the research objectives, Sampling and Data Collection; Unit of Analysis; Coding Categories; Coding Process; Reliability and Validity; Data Analysis; Interpretation; Report the Findings.

The categories analyzed were the role of the university in the Innovation Ecosystem and transformative learning theory as it is presented in the Chart 8

Chart 8 - Categories of analysis

Category	Specification	Authors
c1-Role of the university	university collaboration as a network orchestrator	Asheim, 2012
	universities that are concerned with supporting the development of an environment that is conducive to innovation in an emerging economy by building partnerships and developing coalitions as leaders in their localities, executing place leadership.	Thomas, Faccin, Asheim, 2020
	Public engagement, social engagement, open access, Diversity, governance, collaborative practices, curriculum	Boisier, 2000
c2- Innovation Ecosystem	Actors, Activities, Artifacts developed	Grandstrand & Holgersson, 2019
	IE as a network of organizations that are interconnected but connected to a company or local platform, which in turn incorporates participants from the production and production sides. from use to the creation and appropriation of new innovation values	Auto & Thomas, 2014
c3- Transformative learning	Reintegration into society from a **new perspective**, fruit of the transforming learning experience.	Mezirow, 1991
	At the educational level, the questions posed are **why** (purpose and objectives, and philosophy), **for whom** (audience and learners), **what** (curriculum), how (learning approach and techniques) and **for which results** (outcomes and assessment system)	Rae, 2005a
	(1) Establish a shared vision for the course. (2) Provide modeling and mastery experiences. (3) Intellectually challenge and encourage students. (4) Personalize attention and feedback. (5) Create experiential lessons that transcend the boundaries of the classroom. (6) Promote ample opportunities for reflection and reflection.	Slavich & Zimbardo, 2012.

Source: Elaborated by the author based on the authors cited

As depicted in Chart 8, Category 1 explores the university's pivotal role within the innovation ecosystem, unraveling the intricacies of collaborative practices, partnerships, and social engagements that shaped the analyzed case.

In Category 2, our focus is directed towards pinpointing the key actors involved, delineating the activities undertaken, and discerning the artifacts generated within the context of the case. This category provides valuable insights into the dynamics of collaboration.

Category 3 delves into the lived experiences within the case, probing for elements that may have facilitated transformative learning. Additionally, this category remains open to capturing any emergent themes that might arise from the field, ensuring a dynamic and adaptive approach to understanding the innovation ecosystem

4. RESULT ANALYSIS

This chapter will present the results of research involving the role of the three largest universities in the city of Porto Alegre, PUCRS, UFRGS, UNISINOS which created a partnership between quadruple helix actors with the purpose of enhancing Porto Alegre as a hub of excellence in innovation, technological progress and quality of life which led to the establishment of Pacto Alegre and the offering of the MBA in Innovation Ecosystem. Subsequently, the case will be presented more specifically, with its characteristics and relevance to the Innovation Ecosystem of the city of Porto Alegre. Therefore, this chapter will be divided into three parts, the first presenting the case of the relevant characteristics. The second part will be analytical through the categories: Innovation Ecosystem, The role of the University and Transformative learning, encompassing the propositions of this study. And the next part will present a suggested framework on how the university through transformative learning can contribute to the innovation ecosystem.

4.1 Case Presentation

Pacto Alegre is a movement that seeks to transform Porto Alegre into a reference as a global innovation ecosystem, using innovation as a means, not as an end, that is, innovation as something that leverages us, to have a better quality of life, improve the social, economic and development condition of the city, including making a transition to this new economy that is approaching faster and faster with digital processes (Pinto - sessão da camara, 2021). The Pact is based on the logic of acting together, of finding convergence. The convergence came from the union of the three biggest universities of the city of Porto Alegre: PUCRS, UFRGS and UNISINOS, which will be presented below

4.1.1 PUCRS - The Pontifical Catholic University of Rio Grande do Sul

According to the official page of the university (2023), PUCRS, Founded in 1948, is a reference in higher education and research in the country and in the world, consisting of several units (schools, institutes, etc.) that promote professional and scientific development at the higher education level as well as theoretical and hands-on research in the main academic areas. The institution is keen to store and make the findings of its research actions and extension activities available to the public.

The university has a total of 59 undergraduate courses, 10 online courses, 22 Master's courses and 22 Doctorate degree courses. It has more than 40 thousand students and more than 170 thousand alumni. 2.850 professors and administrative staff.

It consists of its Main Campus, in Porto Alegre, the capital of Rio Grande do Sul and the southernmost capital of Brazil, and of another TecnoPUCRS unit in Viamão, in the Greater Metropolitan Area. The PUCRS campus offers a true university experience in an environment that fosters learning and growth, combining extensive and modern facilities with a highly qualified faculty. PUCRS is a microcosm of society, where thousands of people circulate daily. It is a living environment, growing harmoniously in size, complexity and quality.

A Marist university of excellence, aimed at the comprehensive education of our students, in their religious, humanistic, scientific, professional and citizen dimensions, and which contribute to the development and progress of Rio Grande do Sul and Brazil, and according to the Folha 2023 University Ranking (RUF) classified PUCRS as the best private University in Brazil. The research analyzed the 40 educational institutions with the largest number of students in the following categories: research, teaching, market, innovation and internationalization.

According to I3 "PUCRS has stood out in training highly qualified professionals to work in the innovation ecosystem and stands out for its focus on training innovative professionals".

The university has a scientific and technological park called TECNOPUCRS, whose mission is to be an innovation ecosystem that transforms the university and society. The ecosystem involves public and private companies, research centers, startups and professional and business entities in an articulated community that collaborates to develop innovative businesses. With 90 thousand m² of built area, coworking areas, Individual rooms, Environments for meetings and events, Common use areas. Today it forms an ecosystem with more than 250 organizations, totaling more than 6,500 people moving around the Park every day (TecnoPUCRS, 2023).

The organizations that make up the Park are of different sizes, markets and technologies, forming a diverse and rich community of companies and people. The environment provides a rapprochement between members of the Park's companies and the University, through the InovaPUCRS Network (TecnoPUCRS, 2023).

4.1.2 UFRGS- Federal University of Rio Grande do Sul

The Universidade Federal do Rio Grande do Sul, UFRGS (Federal University of Rio Grande do Sul) is a century-old educational institution nationally and internationally recognized. It is centered in Porto Alegre – the capital city of the State of Rio Grande do Sul – and it offers academic programs from all different fields of knowledge, for all stages of education, ranging from elementary to graduate school (UFRGS, 2023).

The qualification of its faculty, composed mostly of master’s and doctorate degree holders, the continuous updating of the infrastructure of laboratories and libraries, the increase to student assistance, as well as the prioritization of its national and international involvement are policies in constant development.

More than 40 thousand people circulate its facilities in search of receiving one of the top 10 most qualified educations in Brazil. This, combined with its leading research programs and expressive community outreach, grants UFRGS to be ranked among the best universities in the country (UFRGS, 2023).

The public institution is dedicated to serving the community and is committed to education and spreading of knowledge throughout all the courses and activities developed. The university offers 94 undergraduate courses, 77 master course programs, and 73 doctorate programs, 873 research groups, 6029 researches and more than 5000 ongoing projects.

According to I7: "UFRGS stands out for its fundamental role in the production of advanced knowledge, and its excellence in research which contributes significantly to innovation, being an essential pillar in the innovation ecosystem".

The university has a Scientific and Technological Park called – ZENIT – and it aims to promote the University's innovation and entrepreneurship through new ideas that transform the productive sector and bring innovative products and services to society.

At ZENIT Park, you can connect with different programs and develop your company or startup through networking, innovative projects, training and being part of one of the main innovation centers in the southern region of Brazil.

ZENIT Park promotes the creation and development of new scientific, technological and social-based companies, as well as hosting R&D activities of companies that wish to develop innovative projects in cooperation with UFRGS laboratories and research groups. Thus, the purpose is to bring scientific and technological knowledge closer to market demands. We seek to consolidate the local innovation and entrepreneurship ecosystem and assist in the dissemination of entrepreneurial culture and innovation in the most diverse areas of knowledge.

Zenit works with programs and actions based on three pillars: business incubation, entrepreneurial training and open innovation. The Park has a total area of 1421m² that is composed of 6 incubators that operate mainly in the areas of engineering, health, social impact, informatics, agribusiness, food and biotechnology. There are 33 incubated companies, 5 coworking spaces, 2 business laboratories and 1 rapid prototyping multi-user center.

4.1.3 - UNISINOS

The University of the Sinos Valley (UNISINOS) is a private Jesuit university founded in 1969. The main campus of UNISINOS is located in São Leopoldo which is about 18 miles from the state capital of Rio Grande do Sul, and another one located in Porto Alegre.

Considered among the 5 best private institutions in Brazil an several Master's and Doctorate courses in Postgraduate Programs, and more than 45 options in broad sense, and more than 150 thousand students have already graduated, the University has more than 77 options for in-person, distance learning (EaD) and hybrid undergraduate courses, the institution maintains and develops strategic partnerships with companies and universities in Brazil and around the world (UNISINOS, 2023).

At Unisinos, research totals 113 projects, with 225 researchers, in addition to maintaining partnerships with 181 educational institutions in more than 35 countries, which strengthen research and allow scientific exchange of students and researchers. These numbers place the institution among the private education universities in Brazil that invest the most in research.

Furthermore, Unisinos was the first Latin American university to receive ISO 14001 certification and, at the invitation of the United Nations Academic Impact (UNAI), it became the first Brazilian university to be a reference hub for a Sustainable Development Goal (SDG), from the UN (Unisinos, 2023)

The courses offered by the University are anchored in a School concept, divided into six areas: Management and Business, Health, Polytechnic, Law, Humanities and Creative Industry. Schools promote the production of knowledge in the search for innovative solutions to society's challenges.

The Unisinos Innovation Portal connects the University to the market and transforms research and technology into innovation. The Technological Institutes are structured with high-tech equipment and act as partners for companies and organizations, contributing to the competitiveness and sustainability of the state and the country.

With more than 20 years of existence, and its 35 thousand square meters The São Leopoldo Technological Park – Tecnosinos is one of the most solid parks in Latin America, bringing together more than 100 consolidated, graduated and incubated companies, as well as startups. The Park helps the sustainable development of the region, generating around 8 thousand high-value direct jobs, increasing revenue and creating an entrepreneurial culture (Tecnosinos, 2023).

There are currently 110 national and international companies in the Park, generating more than BRL 2.5 billion and 120 registered items of intellectual property. The Park has established a cauldron of innovation and economic drive, by bringing together a range of enterprises from multinationals to dozens of startup companies, grown and developed by the Innovation and Technology Unit (Unitec).

According to I8: "Unisinos sets itself apart through a hands-on, collaborative learning experience. Deeply embedded in the innovation ecosystem, they connect students with companies and networks, fostering an entrepreneurial spirit".

4.2 The city and the Alliance for Innovation

Based on the alliance and partnership made by the three reference universities (PUCRS, UFRGS and UNISINOS) in the city of Porto Alegre, Pacto Alegre implemented the proposal for a movement of articulation and efficiency in carrying out transformative projects with broad impact for the city. The objective is to create conditions for the city to become a hub for innovation, attracting investment and entrepreneurship. The agreement provides for the sharing of resources and partnerships with public authorities and the private sector. The idea is to unite the city's forces, from all segments, in favor of a common agenda and transform Porto Alegre into a world-class innovation ecosystem to create a better future for all people (Pacto Alegre, 2023).

Home to the largest urban concentration in the South region and the fifth most populous in Brazil, it developed quickly and today is home to 1.332.845 million inhabitants (IBGE, 2022), within the municipal limits and around 4,311,019 inhabitants in the metropolitan region and a territory estimated at 496.8 km². Furthermore, Porto Alegre is one of the most wooded and literate cities in the country, with a schooling enrollment rate of 96.6% it is a regional hub for attracting migrants in search of better living, working and studying conditions.

The city was formed following the arrival of Azorean couples in the mid-18th century. In the 19th century it saw the influx of many German and Italian immigrants, also receiving Spaniards, Africans, Poles and Lebanese, among others. It is characterized by being one of the main urban centers in economic, social and cultural exchange terms throughout Brazil, according to data released by IBGE 2022.

Since the 90s, Porto Alegre has been experiencing four important project cycles with broad societal involvement to transform the city into a world-class innovation ecosystem. PAT – Porto Alegre Tecnópole Program (first cycle), CITE – Community, Innovation, Technology and Entrepreneurship (second cycle), Inovapoa – Development and Innovation Agency for Porto Alegre (third cycle) and Pacto Alegre (fourth cycle) .

These movements generated a convergent and dynamic cultural mix between people, ideas and projects in the area of innovation. Throughout the four cycles, several governments from different parties acted in this direction, in harmony and engagement with academic and business segments.

The 90s were a milestone for innovation environments in Rio Grande do Sul. In 1995, Porto Alegre City Hall organized an action that involved nine triple helix entities (FIERGS, FEDERASUL, SEBRAE, CUT, PUCRS, UNISINOS, UFRGS, PMPA and State of RS) within the metropolitan region of Porto Alegre, which culminated in the PAT. The project involved an agreement with France and was inspired by the country's technopolises. The beginning of the 2000s was marked by the emergence of the São Leopoldo IT Hub, a precursor to the State's innovation environments.

Then, in 2003, the PUCRS Scientific and Technological Park (TecnoPUCRS) emerged in Porto Alegre, and in 2009, the São Leopoldo Technological Park, next to Unisinos (Tecnosinos). Both became national references. Following this, the FEEVALE Technological Park was inaugurated, in the metropolitan region; and ZENIT, UFRGS Scientific and Technological Park, in Porto Alegre. Over this period, incubators and coworking spaces have proliferated in the capital, both in Universities (CEI, HESTIA, ICBIOT and other incubators of the UFRGS Incubator Network, RAIAR at PUCRS, ESPM, etc.), and in government initiatives municipal (IETEC and POA.HUB) and in private enterprises (Nós, Flowork, UFO, Area 51, etc.) (Pacto Alegre, 2019).

The second cycle, in the 2010s, a new movement emerged with a similar scope to PAT, but focused on the city and led by businesspeople, CITE. The group was made up of technology entrepreneurs and leading professionals in the business and academic areas, inspired by Silicon Valley, in the United States. They had a common purpose: to modernize Porto Alegre's development process and, consequently, reposition the capital in the international scenario of investments in

innovation. The third cycle sought to reinforce Porto Alegre's position in the area of innovation, and a structure capable of promoting the topic was implemented in the city hall. Thus, Inovapoa was conceived, an agency structured along the lines of successful international experiences and implemented as part of the city hall office. Over the years, this action was carried out mainly by public authorities (Pacto Alegre, 2019).

The fourth and last cycle started, more specifically, in 2018, on the initiative of the Universities UFRGS, UNISINOS and PUCRS, when the Alliance for Innovation was created. In 2019, the Pacto Alegre emerged, bringing together the components of the quadruple helix, driven by the Alliance, together with the City Hall, and under the leadership of Rectors Rui Oppermann (UFRGS), Father Marcelo Aquino (UNISINOS) and Brother Evilázio Teixeira (PUCRS), together with Mayor Nelson Marchezan Jr, with the active participation of businessmen Aod Cunha, Marciano Testa and Nelson Sirotsky, using the Barcelona model as a reference.

Figure 5 - formalization of the alliance for innovation

source: Ascom Sdect, 2018

Adner (2006) states that belonging to an innovation ecosystem can provide the company with value creation and growth, emphasizing that the endogenous potential of the territory and the willingness to innovate are the aspects that encourage the growth and development of the business ecosystem. In this way, the relationship and interdependence existing among actors, as well as the importance of their inter-organizational alliances, located or not in the same territory, create a

favorable environment for investors to be induced by the force of the market to become productive actors, with the ability to transform the economy, generating productive clusters with a tendency to form an innovation ecosystem (Adner, 2006). These actors include organized civil society, allied with universities, companies and government, with the purpose of supporting the evolution of innovation and entrepreneurship ecosystems (Carayannis & Campbell, 2009;

In the contemporary landscape, the innovation ecosystem of Porto Alegre is characterized by a diverse array of influential stakeholders. These entities encompass various sectors, such as:

- Enterprises: Porto Alegre hosts a spectrum of enterprises, encompassing startups, technology firms, manufacturing entities, and service providers, contributing to the dynamic nature of the innovation landscape.

- Government: The municipal administration of Porto Alegre plays a pivotal role in fostering innovation through a multitude of programs and initiatives. Additionally, the active involvement of the government of the state of Rio Grande do Sul, further underscores the concerted efforts at both state and municipal levels (Pacto Alegre, 2023).

- Educational Institutions: A significant facet of the innovation ecosystem is represented by esteemed universities, prominently the Federal University of Rio Grande do Sul (UFRGS), the Pontifical Catholic University of Rio Grande do Sul (PUCRS), and the University of Vale do Rio dos Sinos (Unisinos). Noteworthy components include the PUCRS Scientific and Technological Park (TecnoPUCRS), the UFRGS Science and Technology Park (Zenit), and the Unisinos Science and Technology Park (TecnoUnisinos), all of which contribute substantially to the knowledge and technology transfer.

- Non-Profit Organizations: Playing a crucial role in advancing the innovation landscape, non-profit organizations such as the Associação Gaúcha de Startups (AGS) and the Instituto Caldeira (Pacto Alegre, 2023) actively contribute to the collaborative framework. Additionally, the vibrant participation of civil society members further enriches the ecosystem.

This multifaceted collaboration among companies, governmental bodies, educational institutions, and non-profit organizations reflects the comprehensive and interconnected nature of Porto Alegre's innovation ecosystem, contributing to its vibrancy and sustained growth.

Officially initiated in 2018, Pacto Alegre originated under the auspices of the Alliance for Innovation. The Alliance for Innovation formalized an agreement in April 2017 among the rectors of the three foremost universities in the state of Rio Grande do Sul: the University of Vale do Rio dos Sinos (UNISINOS), the Pontifical Catholic University of Rio Grande do Sul (PUCRS), and the Federal University of Rio Grande do Sul (UFRGS). This agreement aimed to nurture the innovation network within the city of Porto Alegre. Subsequently, in November 2018, a formal signing ceremony for the Pact for Innovation, known as Pacto Alegre (Pacto Alegre, 2019), took place.

According to Pinto (2021), the repercussions of the Alliance were great, hence, there were conditions to propose the launch of the Pacto Alegre, which takes place on the city's anniversary, as a gift to the city, in March 2019, with representation from all segments of the four-helix. The logic is that the most important segments of the city commit to this joint agenda of advances. We had 79 entities that made up that table at the beginning with this spirit of working together in the city.

According to the rector of UFRGS Bulhões Mendes, the Alliance for Innovation between the 3 universities demonstrates the maturity of this triple partnership, which is already bearing fruit and promotes innovative advances in teaching, research and extension, generating benefits for our academic communities and for society as one all (Pacto Alegre, 2023). The rector of Unisinos, Mariucci says the Alliance is important because it believes in the strength of collaboration in favor of a creative and entrepreneurial ecosystem, where innovation occurs integrated with socio-environmental development, quality and equity in education. And the rector of PUCRS university states that they have the objective of enhancing high-impact actions to advance the innovation and development ecosystem throughout Rio Grande do Sul, and PUCRS, together with UFRGS and Unisinos, continue to seek improvements for higher education” (Pacto Alegre, 2023)

The Alliance for Innovation collaborated with the Porto Alegre City Hall and entities representing the capital in this endeavor. The overarching objective of establishing the Pacto Alegre is to promote impactful initiatives contributing to the city's development.

This project, predominantly top-down (although with several bottom-up initiatives), was called Pacto Alegre and proposed the articulation of actors to generate efficiency in carrying out transformative and high-impact projects (Pacto Alegre, 2019). Initially, the actors collaborated in defining the purpose to be achieved, the mission to be pursued, the vision that would guide the project, the principles that

would sustain it, the methodological approach to be adopted and, finally, the manifesto that would communicate all these aspects. to external agents. Each of these initial elements established the foundation upon which the pact has evolved to this day.

To sustain this rapid development, seven non-negotiable values were listed (everyone's interest, commitment, cooperation, inclusion, transparency, creativity and entrepreneurship) and the methodology to be used was defined with the help and external advice of Joseph Piquè, one of the creators of the Barcelona project 22@.

The methodology developed allowed the development of solutions and projects through the creation of collective commitment and a sense of urgency. After these initial joint definitions, a diagnosis was made of the city's situation and the Innovation Ecosystem (through 5 workshops and design thinking sessions organized by the Alliance for Innovation) with the objective, mission and vision of the Pact as a guide.

Subsequently, the table (forum of the actors involved to guarantee the traction of the projects) was responsible for defining the challenges based on the axes: social, economic, urban and governance. Therefore, in a convergence of axes and challenges emerged in the projects that the ecosystem deposited its financial, labor and articulation resources

At the beginning, the six challenges that are considered structuring for the city are established: improving the business environment, promoting education and talents, it starts with talents, the table itself asks us to include education in this challenge; the city's image, how to design Porto Alegre so that the city is able to attract tourists, attract attention, exchange talents with the rest of the world, so we need to work better on the city's image: urban transformation (Pinto, 2021)

According to Pinto (2021) in order to have urban transformation

> it is necessary to have a symmetry of structuring projects, and all the entities that were invited to be part of the table stated that at some point that no matter what we did, if we did not demand education, the long term of the city was not guaranteed. The concern with education is clear, that is, we have to transform education, we have to educate for the future, we have to think about new talents; At the same time, some actions that were proposed in the first actions of the project were almost topical, we had to start doing some things,

> and this reflects the moment in which we lived in the city (Pinto, 2021 p.13).

Zen *et al* (2019) state that cities with more education and a high level of human capital are able to create and take advantage of better opportunities, not only reacting, but also anticipating global changes and trends. In this sense, the teaching methodology stands out as an important tool in the development of the ecosystem, opportunities to stimulate and promote the training of talents, the development of a critical vision in different contexts is an important aspect in the training of professionals (zen *et al*, 2019).

During the mapping the perceptions and challenges of Porto Alegre's innovation ecosystem zen *et al* (2019) bring 5 recommendations: 1. Align talent training strategies from basic to higher education, with a focus on entrepreneurship and innovation. 2. Disseminate good practices and methodologies for basic education. 3. Create a communication campaign for Porto Alegre, as a more attractive, modern, agile and dynamic city. 4. Improve the training, retention and attraction of talent with opportunities for practical experiences and a global and critical vision of society's challenges. 5. Spread knowledge about intellectual property and business models to researchers and entrepreneurs.

Another aspect brought during the mapping of the innovation ecosystem was the lack of rapprochement between the different actors that make up the ecosystem (universities, government, society and companies) may be due to the few widespread joint actions, or even a strong culture of "generalization" (polarization). The result of this context are isolated initiatives, with less potential impact on society. At the same time, this element was also presented as the main opportunity for ecosystem transformation, that is, the mobilization of actors to carry out projects with shared gains and great impact (Zen et al, 2019).

In this way, collaborative projects in the area of education for the Porto Alegre ecosystem that unite infrastructure with institutional and cultural arrangements, attracting entrepreneurs and resources, constituting organizations that enhance the development of the knowledge society were highlighted as an opportunity for the city

Thus, the MBA in Innovation Ecosystem, created collaboratively by the three educational institutions in the city, UFRGS, PUCRS and UNISINOS, which addresses the spaces that add infrastructure and institutional and cultural arrangements, which

attract entrepreneurs and financial resources, constitute places that enhance the development of the knowledge society and include, among others, science and technology parks, smart cities, innovation districts and technology hubs(PPC MBA in Innovation Ecosystem, 2019).

Furthermore, it explores the mechanisms that promote innovative ventures and support the development of technology-based start-ups, which involve innovative businesses, and include, among others, business incubators, business accelerators, open cooperative work spaces and open prototyping laboratories of products and processes.

State Secretary for Innovation, Science and Technology and course curator at UFRGS explains the course offers the necessary content for the training of professionals who are capable of leading the innovative process in public and private organizations, in the third sector and who, mainly, have a global vision of the relevance of innovation in the generation of wealth and in the strategy of business (Lamb, 2019)

Thus, the creation of this course offers a global view of new ecosystems and innovative aspects from different angles and perspectives, influencing the development of people, businesses, regions and countries. The course works on building and managing an innovation ecosystem where the student can interact strategically and identify partners for the development of joint projects, forming an innovative learning environment (Unisinos, 2019).

The Vice-Rector of Academic and International Relations at Unisinos and Curator of the Course states that the three universities are engaged in transforming the city of Porto Alegre into an innovative, high-impact ecosystem that promotes an environment where people can find new job opportunities and conditions to develop their businesses. The best experts and professors from PUCRS, UFRGS and Unisinos come together to provide a very high level course on the topic.

The course is an initiative of mutual cooperation between institutions to develop professionals engaged in the management, operation, or utilization of innovation ecosystems by combining relevant knowledge from the three universities.

Throughout the course, students strategically engage in identifying partners for collaborative projects, creating an innovative learning environment. The MBA aims to cover various innovation ecosystems and the means for their access and development. The course also provides opportunities for reflection on the boundaries,

structures, and management of these ecosystems, enabling individuals, businesses, and organizations to interact and develop projects in an environment of learning and innovative creation (PUCRS, 2024).

The curriculum offers immersive experiences with the aim of transforming Porto Alegre into a reference in the field of innovation and entrepreneurship by leveraging local, national, and international connections. It provides insights into the boundaries, structure, and management of various types of ecosystems, teaching how to explore and develop projects to boost innovation in organizations. It also develops the construction and management of an innovation ecosystem, strategically interacting and identifying partners for joint project development, forming an environment of learning and innovation. Additionally, it offers a broad view of the subject through disciplines such as global innovation ecosystems, innovation-promoting environments in Brazil, technological parks and incubators, and digital transformation (UNISINOS, 2024).

Chart 9 - Definitions of the Case

Alliance for Innovation	The Alliance for Innovation is a joint effort between UFRGS, PUCRS and UNISINOS. The union of the three universities aims to enhance high-impact actions to advance the innovation and development ecosystem. The Alliance wants to transform the region into an international reference in the environment of innovation, knowledge and entrepreneurship. A joint effort by the three universities whose vision of the future is to build a more welcoming ecosystem, better for undertaking and living. In addition to offering innovative opportunities to train and attract talent, the movement to change the region aims to engage society, as well as other institutions, public authorities, companies and associations (Aliança para Inovação, 2023)
Pacto Alegre	Pacto Alegre is an initiative launched in 2019 to promote the development of the innovation ecosystem, the economic and social development of the city through innovation in Porto Alegre. The Pacto is generated from the partnership between the Alliance for Innovation, the municipal government of Porto Alegre and civil society. The Pact aims to promote collaboration between different actors in the innovation ecosystem, support the creation of startups and innovative companies and generate a positive impact on society (Pacto Alegre, 2023).
MBA in Innovation Ecosystem	MBA in Innovation Ecosystems was a course launched based on an objective of the Happy pact, in which the Alliance for Innovation created jointly and collaboratively between the three universities that seeks to develop a global vision on innovation ecosystems aiming to provide a global view of innovation ecosystems and present various aspects of innovation from different angles and perspectives, leading to an understanding of all components of the ecosystem, influences and potential impacts on the development of

	people, businesses, regions and countries. (PPC do MBA, 2019)

Source: Research data

Through the interviews conducted in this study, engaging with members of the Alliance for Innovation and professors associated with the MBA in Innovation Ecosystem, a discernible set of attributes and characteristics defining Porto Alegre's innovation landscape comes to light. So, according to I5:

> I think 2017 may have been the low point. It kind of served as a wake-up call for everyone that we needed an ecosystemic response to build a new moment in the city. In the end, we realized that we had very qualified actors; we were a bit in the PSG syndrome, right? It's not enough to have Neymar, Messi, and Mbappé on the team. I need to make them play in a coordinated way within the system. And then you start to realize that, in reality, what we would need is the implementation of an abundance logic in an ecosystemic vision… Instead of now seeing innovation happening in Boston or Shanghai, which had very different characteristics, we were seeing it happening in Recife, right? With the digital point happening there in Santa Catarina, right? In 2017, we had a bit of the feeling that Porto Alegre was stuck. There was a famous email message at the time, as there was no WhatsApp then, that was shared in various places, saying that the only way out of Porto Alegre was the airport. (I5)

The Alliance is a pivotal force in shaping Porto Alegre's innovation ecosystem. "The university, by its very nature, possesses the ability to bring together diverse actors and sectors within society, emerging as a neutral entity" (I7). The interviewees also said that in contrast to the public sector and government, often perceived with a distinct agenda for profit and vested interests, the university, when assuming a leadership role, introduces a unique dynamic. This was evident in the case of the Alliance in Porto Alegre, where the university played a central role, in steering the initiative towards a transformative path.

I2 emphasizes a crucial objective: transforming the alliance into a vehicle for tangible outcomes.

> The focus was on translating intentions into concrete actions, and the identified avenue for this transformative impact was education. With just three universities united under the alliance banner, the shared vision was clear – to revolutionize through education and foster innovation. The MBA program, therefore, was strategically designed not only as a course but as a catalyst, igniting a movement aimed at the establishment of a dynamic innovation ecosystem (I2)

These defining features encompass Porto Alegre's innovation ecosystem. That is made up of a variety of actors, which contributes to the generation of innovative ideas and solutions. I10 explains the alliance was the starting point for a slightly more horizontal construction and better communication and interaction.

> We had three great institutions here, the best in Brazil, right? UFRGS is the best public institution in the country, PUCRS is the third private company, we |UNISINOS| are the fourth private university and each one is always doing specific work, with high-impact technology parks, in this case especially PUCRS and ours, UFRGS is still at another level and is still developing in a relevant way too, and each one is always going one way, you could say. So I think the configuration of the alliance was the main point, right? From this, the relationship between universities opens space for debate with society, with the municipal and state government, with companies in the city with a great diversity of actors.

According to I4: the role of each actor is something prescriptive or prescriptible when constituting an ecosystem, in Porto Alegre this movement of the alliance, "universities played a fundamental role in articulating all actors, attracting projects and in the process itself, action by government, companies and civil society. But this often changes in some contexts." It is the government that has this role. In some contexts and even companies, in Porto Alegre it was universities.

> And in fact, Piquet today cites the case of Porto Alegre a lot as a case in which we begin to activate an innovation ecosystem through the academic axis. These aren't very common cases around the world, right? Because I think academics often end up being immersed in their own borders, in a life that is almost detached from reality, right? It's much more about looking at a theoretical agenda than a practical agenda of bringing and transferring knowledge for the benefit of the city as a whole. And these movements end up having, most of the time, government leaders and then they have a problem, because as the government changes they sometimes become very associated with the government's DNA. There's a problem with many of them being able to transpose government mandates, right?" (I5).

Interviewee 8 highlights that "the alliance was a unique collaborative effort between three great universities that still serve as an example for the entire country today. I would even say globally, right?" The reason for that is because it generated many publications and international repercussions. According to her: "I would say that the projects arising from the alliance are successful as well" (I8).

I1 states “If we look at the Innovation Ecosystem and examine the role of universities, in the case of Pacto Alegre and the alliance for innovation, universities have a pioneering role, a role of provoking, and seeking to structure. The three

universities are the ones that sought to structure our Innovation Ecosystem. So, it is from these three universities that the organization begins, and then other actors join.

Transformative learning serves as a crucial catalyst in propelling the innovation ecosystem, as evident in the case of Porto Alegre's Alliance for Innovation and its associated MBA program. Through interviews with key members, a distinctive set of attributes defining the city's innovation landscape emerged, emphasizing the need for transformative responses to overcome stagnation.

In 2017, a pivotal realization occurred, marking a turning point for Porto Alegre. The city acknowledged the necessity for an ecosystemic response, understanding that having highly qualified actors, akin to star players in a team, is insufficient without coordinated teamwork. The implementation of an abundance logic within an ecosystemic vision became imperative

The Alliance, a collaborative effort of universities, played a central role in reshaping the city's innovation landscape. Universities, being neutral entities, possess the unique ability to bring together diverse actors and sectors within society. Unlike the profit-driven agenda often associated with the public sector, the university, when assuming a leadership role, introduces a distinctive dynamic. This dynamic was evident in Porto Alegre, where the university-led Alliance steered the initiative towards transformative pathways (Alliance for Innovation, 2018)

The transformative impact sought by the Alliance focused on translating intentions into tangible outcomes through education. The MBA program, strategically designed as a catalyst, aimed to revolutionize education and foster innovation. The three universities under the alliance banner shared a vision to create a dynamic innovation ecosystem, emphasizing the role of education in catalyzing this transformation(PUCRS, 2024).

Defining features of Porto Alegre's innovation ecosystem include diverse actors contributing to the generation of innovative ideas and solutions. The Alliance played a crucial role in fostering horizontal construction, better communication, and interaction among institutions, government, and businesses.

From the interviews it was possible to comprehend the role of universities in constituting an innovation ecosystem is prescriptive in Porto Alegre. The Alliance, involving the three prominent universities, played a fundamental role in articulating actors, attracting projects, and catalyzing the collaboration of government, companies, and civil society. This academic-led approach is highlighted as a unique

case, often uncommon globally, where universities actively engage in the practical transfer of knowledge for the benefit of the city.

In conclusion, the transformative learning experiences facilitated by the MBA in Innovation Ecosystem, spearheaded by the Alliance for Innovation in Porto Alegre, underscore the pivotal role of education in catalyzing innovation. By fostering a culture of transformative learning, universities can lead the way in shaping dynamic innovation ecosystems, promoting collaboration, and driving tangible outcomes for societal and economic development.

5. THE ROLE OF UNIVERSITIES IN FOSTERING TRANSFORMATIVE LEARNING AND FUELING THE INNOVATION ECOSYSTEM

The exploratory study employed a comprehensive approach through interviews with 19 key actors within the context of the Alliance for Innovation, Pacto Alegre, and in the creation and execution of the MBA in Innovation Ecosystem. These actors, denoted as I1 to I19, provided valuable insights into the studied case. The interconnection among these diverse actors underscores the intricacy of the innovation ecosystem and emphasizes the significance of a collaborative approach.

The Alliance for Innovation emerged as a recurring theme in the interviews, shedding light on the imperative need for collaboration among the quadruple helix—government, universities, the private sector, and civil society.

According to I5: In 2018, the three-helix – government, private market, and universities – were more dynamically engaged, especially because the social helix came into play a bit later.

> Among other actors involved, there were reputable entrepreneurs, government official members, and university representatives. We recognized that the government, operating independently, faced challenges due to a lack of synergy in the relationship between entrepreneurs and the government; there was a reluctance to invest collaboratively.
> Consequently, attention shifted towards universities, with the realization that they should spearhead the movement as they didn't have conflicting agendas in the city's development. This initiative was distinct from government promotion or business interests. Subsequently, we contemplated how to signify the commencement of this new era. Essentially, how could we manifest the embrace of this novel spirit that we sought to cultivate within the pact? This contemplation led us to conceptualize the Alliance for Innovation (I5)

It shows that the triple helix still remains a valuable model to organize the ecosystem structure. Interviewee 5 suggests a recognition that success and progress are increasingly tied to the ability to form and engage in collaborative networks or partnerships, which in a certain sense is the triple helix goal, linking different actors.

> We will underscore and communicate the understanding we've gained: the key to success in the twenty-first century lies in engaging with the game of collaborative networks. Demonstrating that universities were taking the initial step towards understanding that the whole can be greater than the sum of its parts, that by uniting forces, I don't lose; instead, I gain time by having qualified allies who will join me in advance, right? There are certain

> emergent properties when you form a network, more than the mere sum of its parts, you know? Together, it ends up having additional value.

The reference to forming a network implies that there are benefits and outcomes that arise from collaboration that may not be immediately evident when looking at individual parts. This aligns with the idea that the synergy of a well-constructed collaborative network can lead to innovative and unexpected results.

It captures a mindset shift towards a more interconnected and collaborative approach to addressing challenges, with an awareness that the collaborative game is the key to success in the twenty-first century.

Camarinha-Matos (2006) intricately portrays collaborative networks as sophisticated socio-technical systems that evolve from the collective collaboration of diverse entities, encompassing organizations, individuals, and systems, all united in their pursuit of a common goal. Expanding on this notion, Provan (2023) underscores the pivotal role of collaborative networks as potent instruments for confronting challenges within public management. Acknowledging that these challenges extend beyond the capabilities of individual organizations, collaboration with diverse entities becomes indispensable to achieving substantive progress in effectively managing these intricate issues.

Incorporating external collaborations is proposed in the literature as a strategic catalyst, offering firms a multifaceted advantage. By engaging with external entities, organizations gain a strategic edge by acquiring valuable feedback and honing their internal knowledge and skills through exposure to external expertise. This collaborative synergy becomes a conduit for assimilating cutting-edge technical and scientific information, laying the groundwork for future advancements (Chesbrough, 2003). This proactive approach not only fortifies the firm's current capabilities but also strategically seeds innovation for future development. The literature posits that such collaborative endeavors serve as dynamic mechanisms, propelling organizations beyond traditional boundaries and fostering an environment of continuous learning and growth.

As emphasized in the literature, innovation relying on knowledge exchange and collaborative networks plays a crucial role in managing complex knowledge (Singh, 2005). This underscores the pivotal role of collaborative networks in facilitating knowledge exchange as a key driver of innovation within organizations,

further highlighting their significance in navigating the intricacies of contemporary knowledge management.

Similarly, I2 emphasizes that the creation of the alliance demonstrates the collective acceptance of the idea that they form a collaborative group, characterized by mutual cooperation and joint action and I9 reinforces the collaboration between different actors.

> We engaged in this collaborative interaction at a certain juncture. Our embrace of the notion that we constitute a cooperative group, working and creating together, and conducting joint research, underscores our collective impact. By bringing tangible outcomes to fruition in the short term and witnessing their effects, we've made a substantial contribution characterized by a notable network effect (I2)

> Sharing knowledge for real, that was a very interesting paradigm shift because everyone worked, worked very well, but each one looked after their own interests and did little together. So, when you attend the events' sessions, you'd think, 'We don't work together, right?' I met some professors from the same area, from the same city as me, at national and international events. But we never reached out to talk and develop projects with each other. Today, we must have three projects running simultaneously (I9)

The study revealed the construction of robust partnerships as an effective strategy to drive innovative initiatives in the context of the studied Innovation Ecosystem. The Pacto Alegre, highlighted as a key element, plays a crucial role in promoting an innovative and transformative culture in the city. The analysis of interviews revealed significant challenges in the development of the MBA, ranging from practical issues to conceptual challenges, showcasing an adaptive approach over time.

I5 explains that

> Among the first actions of the alliance, a very important one was the "pact". since we needed to show That we were starting to operate in some different way. So we wrote the first draft of the agreement between universities that was signed. There is formally an agreement between universities that constitutes the alliance for innovation.
> We knew deep down that the alliance was a trigger for the pact but it also had to manifest itself, it couldn't be false, we had to start doing things together to bring this mentality together. So when we manage to work on this logic of working together, of having more allies than enemies is something I mention a lot, this activates certain reward mechanisms that are inside our heads, and things start to flow. (I5)

Here, it is important to accentuate the pivotal role of the "pact" as a significant early action of the alliance. The need to demonstrate a shift in operational

approaches led to the drafting and signing of the first agreement between universities, officially forming the Alliance for Innovation. The emphasis on authenticity and tangible collaboration is underscored, recognizing that the alliance needed to go beyond mere symbolism. The mention of working together and fostering more allies than enemies speaks to the transformative power of collaborative efforts, triggering positive cognitive and motivational mechanisms. Overall, the passage illustrates the strategic importance of tangible actions in reinforcing the mindset shift within the alliance.

According to Markkula & Kune (2015), Innovation ecosystems rely on collaboration among diverse stakeholders, known as Quadruple Helix actors, including businesses, academia, government, and civil society. Together, they co-create and exploit knowledge, explore opportunities, and build capacity, driving innovation. By fostering alliances, sharing resources, and embracing collaboration, these actors propel progress, identify emerging trends, and empower communities for sustainable growth and societal benefit.

In the same way, I11 explains that in terms of effectiveness, "the main delivery of the alliance is certainly the pact for everything it has represented in the city in the various deliveries and projects that are within the pact, and then there was the MBA another".

> “But I would say that the main result is the mentality that this brought. Because this example was given that large institutions will be able to choose projects together like this. So this was a paradigm shift to a more collaborative paradigm of working across the city. I think that was the main message that came from this cooperation agreement” (I11).

Many of the interviewees also mention the importance of understanding the current innovation landscape, considering technological trends, market demands, and socio-economic challenges. The alliance for innovation is highlighted as a relevant strategy to boost collaboration across different sectors and address complex challenges.

I8 explains "The alliance among universities is not just a partnership on paper. We are actively working to promote innovation in various regions. Technological transfer is an integral part of our responsibilities." In line with this, I7 highlights a broader goal of ecosystem activation. Their focus extends to influencing, establishing alliances, and promoting innovation at different levels, surpassing the realms of

traditional teaching and research. Together, these perspectives underscore a comprehensive commitment to fostering innovation and collaboration within the ecosystem.

The alliance is vital for overcoming barriers between sectors, and fostering a collaborative environment. This emphasis on synergy reflects the need for a diversity of knowledge to drive innovation. as I2 says: "The alliance for innovation is essential for bringing together different expertise. The synergy between academia, industry, and government enhances innovation". In the broader context, the innovation ecosystem, as outlined by Martins *et al*. (2020), is intricately shaped by the interactions between economic agents, non-economic elements, and the dynamic flow of resources.

Thomas & Autio, (2020) argue that an innovation ecosystem is a community of hierarchically independent, yet interdependent heterogeneous participants who collectively generate a coherent, ecosystem-level output and related value offering targeted at a defined user audience.

As can be discerned from the above definition, it is considered ecosystems as structures for value co-production: ecosystems are organizational collectives that combine efforts to create a coherent, system-level value offering that targets a defined audience. Ecosystems ‘do’ something to create value for someone.

The actors within this ecosystem, engaged in various relationships such as consumer-resource dynamics, mutualism, or competition, significantly contribute to its evolution. The diversity of actors across different stages is indicative of the ecosystem's development. It underlines that creating innovation ecosystems is feasible, but it requires effective governance and a continual pursuit of optimal characteristics to ensure adaptation and sustainability.

Cai et al. (2020) argue that the innovation ecosystem's novelty lies in its ecological nature, marked by the interdependence among diverse collaborative actors and the ongoing co-evolution and co-creation that bind them together. Additionally, they discuss the concept of "co-innovation" networks (24) in understanding innovation ecosystems. Co-innovation networks within innovation ecosystems emphasize collaboration, coordination, co-creation, convergence, and complementary efforts among stakeholders. These networks facilitate co-evolution, co-specialization, and co-opetition within and across regional and sectoral innovation ecosystems. By bringing together diverse perspectives, knowledge, and resources,

co-innovation networks drive the creation of new solutions, technologies, and products that address societal challenges and create value Cai et. al (2020)

The interconnectedness between the alliance's emphasis on collaboration and the broader principles of innovation ecosystem dynamics underscores the importance of diverse knowledge networks and effective governance in fostering innovation. Therefore:

Proposition1: Building robust and diverse partnerships is fundamental for nurturing a thriving innovation ecosystem and can be seen as an opportunity for transformative learning.

The study posits that the establishment of robust partnerships serves as a compelling strategy for fostering innovative initiatives, within the examined Innovation Ecosystem many interviewees concur with the current literature and acclaimed the partnerships. By establishing strong collaborations with various stakeholders including businesses, academia, government entities, and civil society organizations, innovative initiatives can gain access to a wealth of resources, expertise, and perspectives.

An innovation ecosystem thrives because different partners bring complementary competences to the ecosystem (Adner, 2017; Jacobides et al., 2018). By leveraging these diverse partnerships, innovation ecosystems can become more resilient, adaptable, and responsive to the needs of the community. They can also facilitate the exchange of ideas and best practices, leading to more effective problem-solving and the emergence of new opportunities.

Establishing robust and diverse partnerships is not just a strategy, but a cornerstone for fostering a dynamic and thriving innovation ecosystem where ideas can flourish, collaborations can thrive, and transformative solutions can be realized.

Overall, the process of building robust and diverse partnerships within an innovation ecosystem provides fertile ground for transformative learning by exposing individuals to diverse perspectives, fostering collaborative problem-solving, and empowering them to take ownership of their learning and contributions to collective efforts and it can catalyze transformative shifts in thinking

Therefore, the evidence gathered in this study shows that Pacto Alegre emerges as a pivotal element, significantly influencing the cultivation of an innovative

and transformative culture within the city, exactly as it acts a form of a platform, creating links among actors and generating opportunities for innovation in a fertile environment.

Also, the alliance for innovation, as emphasized by I4, plays a pivotal role in converging diverse expertise from academia, industry, and government, fostering a synergistic environment that propels innovation. In recognizing the dynamic and intricate nature of the ecosystem, I4 underscores that its scope transcends institutional confines, embracing a spectrum from startups to established companies where interactive collaboration is paramount. This viewpoint positions the understanding of ecosystem dynamics as a sophisticated and interconnected system, emphasizing the necessity for a holistic approach that involves a myriad of actors to effectively stimulate innovation.

Expanding beyond the traditional roles of research and teaching, Kuldmaa (2014) contends that universities are evolving into crucial contributors to entrepreneurial ecosystems. This evolution encompasses activities such as bolstering startups, establishing incubators and accelerators, and facilitating technology transfer. Universities, according to Kuldmaa (2014), are emerging as dynamic forces propelling regional development, actively participating in local economic growth and job creation through entrepreneurial initiatives.

Adner (2017) adds depth to this perspective by asserting that the "ecosystem" construct provides a distinctive framework for comprehending and navigating intricate, interdependent activities across boundaries. Contrary to viewing ecosystems merely as networks or platforms, Adner (2017) redefines them as configurations of activity driven by a specific value proposition. This conceptualization accentuates the importance of purpose and structure within an ecosystem, elevating the discourse beyond mere connections to a nuanced understanding of its intrinsic dynamics.

Concurrently, collaboration and alliance are recognized as essential strategies to propel innovation. The emphasis on involving diverse actors highlights the significance of a holistic approach to tackling complex challenges, as articulated by I3: "The Alliance is an example of ecosystemic collaboration that transcends university boundaries. It collectively engages diverse stakeholders, promoting a unique synergy to drive innovation." This reinforces the interconnected nature of

collaborative efforts, where diverse actors contribute to a unified and synergistic approach for driving innovation and making contributions within the ecosystem.

In this way, it emphasizes the importance of collaboration and alliance as crucial strategies for driving innovation. This directly aligns with the Pacto Alegre's core principle of fostering cooperation between diverse actors within the ecosystem.

Some interviewees give prominence to the transformative nature of the Pacto Alegre, characterizing it as a model that goes beyond mere goal-setting. According to I5, the Pacto Alegre is a catalyst for change that actively involves the university. The commitment is not just about setting objectives but extends to actively participating in the transformation of the city into an innovation hub. I5 sees the university as a key player in driving this change, positioning it as a committed contributor to the broader goal of making the city a hub of innovation. This perspective underscores the proactive role that the university plays in the innovation ecosystem envisioned by the Pacto Alegre.

I8 adds another layer to the discussion by highlighting that the Pacto Alegre not only sets goals but also inspires a cultural shift. According to I8, the Pacto Alegre introduces an innovation mindset, indicating a change in how individuals and local actors approach challenges and opportunities. This cultural change, as expressed by I8, encourages active engagement from local actors in transforming the community. The emphasis on inspiring a cultural change suggests that the Pacto Alegre aims to go beyond specific initiatives and goals, seeking to embed a mindset of innovation within the community. This aligns with the broader goal of creating a sustainable and dynamic innovation ecosystem.

Both perspectives (I5 and I8) highlight the transformative and participatory nature of the Pacto Alegre, with the university playing a central and active role. The initiative not only sets specific goals but also aspires to instill a cultural change that encourages active engagement and innovation within the community, being a catalytic movement, driving the transformation of the ecosystem

The "Alliance for Innovation" and the "Pacto Alegre" are regarded as essential instruments to foster collaboration and overcome existing barriers. These initiatives not only strengthen connectivity among universities, businesses, and the government but also cultivate a culture of innovation and entrepreneurship (I2, I3, I4, I5, I10).

Both the "Alliance for Innovation" and the "Pacto Alegre" act in promoting collaboration within the ecosystem. The emphasis on these initiatives as essential

instruments suggests a recognition of their pivotal role in breaking down barriers and creating synergies.

Furthermore, the mention of strengthening connectivity among universities, businesses, and the government implies a concerted effort to bridge the traditional gaps between academic, private, and public sectors. This connectivity is crucial for fostering a holistic and collaborative approach to innovation.

Camboim, Zawislak, and Pufal (2018) offer a comprehensive definition of a territorial innovation ecosystem, emphasizing its complexity and multifaceted nature. This concept aligns with the principles observed in the discussions around "Pacto Alegre" and the "Alliance for Innovation." The territorial innovation ecosystem, as described by Camboim Zawislak, and Pufal (2018), involves an intricate interplay of urban-environmental factors, socio-institutional structures, and techno-economic dynamics, all governed by interconnected stakeholders.

Connecting this definition to "Pacto Alegre" and the "Alliance for Innovation," we can see parallels in their objectives. Both initiatives, as previously discussed, aim to promote collaboration and overcome barriers across diverse sectors. The territorial innovation ecosystem's emphasis on interconnected stakeholders echoes the collaborative spirit advocated by "Pacto Alegre" and the "Alliance for Innovation." These initiatives actively seek to strengthen connectivity between universities, businesses, and government entities, fostering a holistic approach to innovation.

The focus on creating wealth through a comprehensive innovation process, as highlighted in the definition, aligns with the transformative goals of "Pacto Alegre" and the overarching mission of the "Alliance for Innovation." The pursuit of innovation is not merely for the sake of advancement but is intrinsically linked to the economic development and prosperity of the region.

In this sense, the definition of a territorial innovation ecosystem by Camboim Zawislak, and Pufal (2018) reinforces the interconnected and collaborative nature of initiatives like "Pacto Alegre" and the "Alliance for Innovation." These concepts collectively emphasize the importance of holistic collaboration, involving various stakeholders, to drive comprehensive innovation processes and contribute to regional wealth creation.

In innovation ecosystems, the value created comes from innovations, particularly co-innovations, developed through collaborative relationships. These co-creation partnerships, as Klimas (2019) describes, are a specific type of

collaboration used by organizations aiming to co-create value through joint innovation processes. These partnerships are crucial for bringing innovations to market with the help of external partners. We argue that co-creation relationships for innovation are unique to the concept of innovation ecosystems, as they enable all actors and the entire ecosystem to co-create value through collaborative innovation (Aarikka-Stenroos & Ritala, 2017).

These innovation co-creation relationships in ecosystems can be related to the role of universities in the innovation ecosystem of Porto Alegre, as universities play a crucial role in creating interconnected networks of actors, and facilitating collaboration between different sectors. In this context, innovation co-creation relationships can be seen as a practical expression of this interconnection.

Acting as sources of knowledge and expertise, universities establish innovation co-creation relationships with other actors, such as companies and government entities, to drive the development and implementation of innovations. These relationships not only contribute to value creation, but also foster a culture of innovation and entrepreneurship in the ecosystem.

Therefore, the interaction between universities and other participants in the ecosystem, through innovation co-creation relationships, highlights the importance of these academic institutions in the dynamics of Porto Alegre's innovation ecosystem, promoting collaboration and the joint generation of innovative value.

Universities hold a central position within innovation ecosystems, serving as vital contributors to the inception and development of groundbreaking products, services, and processes. Their role extends beyond traditional academic boundaries, acting as dynamic hubs where inventive ideas are conceived and transformed into tangible innovations. Through cutting-edge research and development, universities contribute to the constant evolution of knowledge, pushing the boundaries of what is possible and enriching the innovation landscape with a steady flow of pioneering solutions (Etzkowitz & Leydesdorff, 2000; Carayannis & Campbell, 2009, Leydesdorff, 2012).

In addition to their role in driving innovation, universities function as connective tissue within these ecosystems. By facilitating collaboration and interaction among diverse sectors of society, they play a pivotal role in knowledge exchange and resource-sharing. Through this collaborative ethos, universities provide an essential conduit for the cross-pollination of ideas, skills, and expertise, fostering a dynamic

environment where innovation thrives across disciplinary boundaries (Etzkowitz & Leydesdorff, 2000)

The role of the university goes beyond traditional teaching, being recognized as an active agent in promoting innovation and regional development. The interviewees highlight the need for a holistic approach, where education, research, and outreach are intertwined to create an environment conducive to innovation.

In the context of the innovation ecosystem, collaborative efforts among universities, companies, civil society, and government entities aim to co-create value through joint activities (Ritala et al., 2013). This collaboration forms the core of an innovation ecosystem, bringing together diverse stakeholders with the common goal of creating and capturing value through collaborative innovation activities centered around a shared value proposition (Jacobides et al., 2018).

According to Helman (2020), various actors within the ecosystem contribute to value creation in distinctive ways. Companies and start-ups focus on growth and self-promotion, while incubators and coworking spaces support start-ups by providing funding opportunities and physical space. Technology parks organize networking events to facilitate connections for startups and small businesses. Universities and research institutions contribute by providing technical and scientific advice, and the government plays a role in supporting innovation initiatives and attracting new investors. Civil society participates by offering advice, support, and financial opportunities.

The territorial perspective, which analyzes success cases in developed and emerging countries, introduces a layer of complexity to the innovation ecosystem. This perspective recognizes that value creation goes beyond economic dimensions, encompassing socio-environmental contributions. The success of the territorial perspective hinges on addressing diverse interests and aligning them throughout the development of the innovation ecosystem. Critical factors for success include social, cultural, institutional, normative, legal, and governmental aspects, extending beyond the technological and organizational/economic factors emphasized by the platform perspective (Santos and Zen, 2023).

Universities play a crucial and interconnected role in various forms of ecosystems, particularly in innovation ecosystems. While the relevance of universities in these ecosystems is acknowledged, challenges persist in understanding how to establish and manage strategic partnerships between

universities and companies, as well as in evaluating initiatives to enhance entrepreneurial and innovation development capacities (Schiuma & Carlucci, 2018).

In the dynamics of innovation ecosystems, companies are central actors driving entrepreneurial and innovative activities. However, universities are equally essential, creating a supportive platform and atmosphere for catalyzing and nurturing entrepreneurial and innovative initiatives. Collaborative relationships between universities and companies are critical components of an innovation ecosystem, leading to significant spillover effects and positive relations with innovation output (Schiuma & Carlucci, 2018).

Universities, functioning as knowledge-intensive producers, play a vital role in the development of local innovation ecosystems (Hernández-Ruiz, 2020). They contribute to knowledge-based processes for entrepreneurial and innovation development by generating, transferring, brokering, codifying, and diffusing specialized knowledge and culture. Additionally, universities serve as sources of graduates, talents, ideas, and skills, contributing to the overall growth of local stakeholders' culture and learning dynamics for sustainable development.

Successful innovation ecosystems require organizations to leverage contributions from various internal and external stakeholders. Building a value proposition throughout the ecosystem necessitates collaboration and active participation from diverse actors (Talmar et al., 2018). Therefore:

Proposition 2: Collaboration and alliances are fundamental strategies for universities to effectively fulfill its role in the Innovation Ecosystem.

Knowledge Exchange and Transfer: Universities possess extensive intellectual resources, including faculty expertise, research facilities, and academic networks. Collaborating with external stakeholders, such as businesses, government agencies, and civil society organizations, allows universities to share their knowledge and expertise while also gaining access to valuable insights and resources from other sectors. This knowledge exchange facilitates the transfer of research findings and innovative ideas into real-world applications, driving valuable innovation across various domains (Etzkowitz, 1998; Cruz-Amarán et al., 2020).

Interdisciplinary Collaboration: Innovation often flourishes at the intersection of different disciplines and fields of study. By forming alliances with diverse partners,

universities can facilitate interdisciplinary collaboration and cross-pollination of ideas. This interdisciplinary approach fosters creativity, expands the scope of research inquiries, and increases the potential for breakthrough innovations that address complex societal challenges (Thomas et al., 2020).

Entrepreneurship and Technology Transfer: Universities are increasingly recognized as engines of entrepreneurship and innovation. Through strategic partnerships with industry partners, startups, and incubators, universities can commercialize their research findings, facilitate technology transfer, and support the development of new ventures. Collaborative initiatives such as technology licensing agreements, joint research projects, and startup incubation programs enable universities to translate their academic discoveries into tangible products, services, and solutions that benefit society (Faccin et al., 2021).

Talent Development and Education: Universities play a vital role in nurturing the next generation of innovators, entrepreneurs, and thought leaders. Collaborative partnerships with industry partners provide students with opportunities for hands-on learning, industry exposure, and real-world problem-solving experiences. By integrating industry perspectives into academic curricula and research projects, universities can better prepare students for careers in innovation-driven sectors and foster a culture of lifelong learning and innovation within the broader community (Heaton et al., 2019).

Collaboration and alliance-building are essential strategies for universities to leverage their unique strengths, resources, and capabilities within the innovation ecosystem. By actively engaging with external stakeholders and fostering collaborative relationships, universities can propel valuable innovation, drive economic growth, and address pressing societal challenges more effectively

This aligns directly with the core principle of Pacto Alegre, emphasizing the promotion of cooperation among diverse actors within the ecosystem. The evidence shows that the more collaboration occurs, more opportunities for innovation and sharing happen and the actors take action on those opportunities. Pacto Alegre works not only because it creates a quadruple helix, but because it expands the possibility of it. This initiative goes beyond the creation of an environment for actors to collaborate and innovate, it creates a large space that functions as a vortex, attracting more and more actors to its core. It has become so big that it requires proper organization and management in order for it to continue offering the best

opportunities for innovation. Though it is not a surprise, the evidence corroborates with the literature (Etzkowitz, 1998; Tolstykh, Gamidullaeva and Shmeleva, 202; Cruz-Amarán et al, 2020; Faccin et al, 2021, Thomas et al, 2020, Heaton et al., 2019) it proves that the larger the ecosystem, the more it has potential to aggregate and create valuable results.

Moreover, the innovation ecosystem, universities extend their role beyond being primary engines for economic growth through knowledge transfer. They are increasingly expected to be socially responsible, aligning with societal changes that demand broader roles for universities. This shift leads to substantial changes within the internal fabric of universities. The renewed understanding of higher education in society becomes a crucial research agenda in studies on innovation in higher education (Cai, 2012; Cai et al., 2020).

Building upon the aforementioned, some considerations are presented. These theoretical considerations offer a groundwork for empirical investigation and a more in-depth exploration of the dynamics within innovation ecosystems, with a specific emphasis on the roles of universities, collaboration, and value co-creation. They take into account insights from the literature and practical examples, such as the Alliance for Innovation and Pacto Alegre, to steer future research and analysis.

By synthesizing theoretical frameworks with real-world observations garnered through interviews and data collection during the research process, these considerations acquire added significance. They not only enrich our understanding of the complex dynamics inherent within innovation ecosystems but also inform strategic decision-making and policy formulation aimed at fostering sustainable innovation and economic development. Therefore, it is imperative to give due attention to these theoretical considerations as they pave the way for a more nuanced and comprehensive exploration of the multifaceted nature of innovation ecosystems and the pivotal role universities play within them.

So, in Chart 10, a summary of some of the points already presented here is provided, brought by the interviewees regarding the innovation ecosystem.

Chart 10: Noteworthy remarks: Innovation Ecosystem

Considerations	Remarks	

1. Networks of actors and Engaged Communities Drive Innovation:	In innovation ecosystems, the formation of extensive networks and active engagement within communities is fundamental for catalyzing innovation. The interconnection among diverse actors, as observed in the Alliance for Innovation and Pacto Alegre, is essential for creating a dynamic environment that fosters collaborative and innovative initiatives.	Collaboration forms are needed to define organizational aims and needs in the context of the ecosystem, and to describe what is required to enable the required quality to be delivered (Markkula and Kune, 2015). "As universities have a pioneering role, a role of provoking, seeking to structure. [...] When we look at the literature, the role of universities is knowledge management." I1 "The specialization course was another initiative for ecosystem development."I5 "The university needs to have more active professors in the innovation ecosystem, representing institutionally in discussion forums, participating in technical working groups to foster more innovation."I2 "Knowledge sharing was a very interesting paradigm shift because everyone worked very well in isolation and did little together. So when you went to event sessions, you'd think, 'We're not working together, are we?' The MBA managed to bring us closer, and then various activities and projects were created together." (I9)
2. **Universities as Central Assets in Innovation Ecosystems:**	Universities play a central role in innovation ecosystems, acting as generators of knowledge and vital contributors to skilled workforce development. This role is particularly crucial in developing countries, such as Porto Alegre, where universities significantly contribute to technological advancement and economic development.	Universities play an important role in innovation ecosystems. In addition to developing human capital and advancing technology, they are increasingly expected to participate as economic development partners with industry and local, state, and national governments (Heaton, Siegel & Teece, 2019) The universities of Porto Alegre, through the innovation alliance, were the main aspect for leveraging the innovation ecosystem (I4)

3. **The Neutral Role and Legitimacy of Universities:**	Universities, by adopting a neutral role and maintaining legitimacy, are essential for fostering effective partnerships and collaborations within innovation ecosystems. Their impartiality strengthens trust among stakeholders, contributing to the establishment of lasting partnerships, as evidenced by initiatives like the Alliance for Innovation.	The universities are more neutral than the government, and the are more stable in a way, the don't change completely every 4 years (I2) the position of the university in the ecosystem And its objectives And its end activities, it ends up being perceived as a more neutral entity, you know? This is also a way of contributing because the university usually comes with reputation, with reliability, right? The university will have an important role in mediating, orchestrating this topic and giving more legitimacy to this field." (I7)
4. **Breaking Barriers and Competition as Drivers of Innovation:**	Overcoming barriers and fostering healthy competition are drivers of innovation within ecosystems. Initiatives like Pacto Alegre, which encourage breaking down obstacles and a competitive yet collaborative environment, stimulate the emergence of innovative solutions.	Collaboration between universities, represented by faculty training and student engagement, is seen as an essential element for the success of the project. Despite competition between institutions in other contexts, this collaboration allows us to break down barriers and boost innovation through the exchange of knowledge and experiences between different actors in the ecosystem. (I6)
5. **Innovation as Culture within Universities:**	Cultivating a culture of innovation within universities is essential for fostering creativity, excellence in research, and a proactive approach to challenges. This cultural shift, exemplified in the context of the Alliance for Innovation, positions innovation as a core value in academic activities.	According to Dobni (2008), the culture of innovation is a multidimensional context, which includes the intention to be innovative, the infrastructure to support innovation, the behaviour at the operational level to influence the market and value orientation, and the environment for innovation implementation "When I promote an MBA in this context, I am inviting this actor to go out and look at the perspective, but I have to structure it, bring an apparatus for it. So it is up to the university to understand the market, but go beyond this market, because if it

		were to look In the context of the era of innovation in RS, we would not have made any transformation.(I6). "One student even created a blog, and live videos on YouTube and encouraged by all the teachers, including by participating in the lives, look how wonderful you made it work, with regard to engagement strategies, dissemination of knowledge, translation, but a A very good thing is when you start to mobilize and operationalize the concept of ecosystem, this was not in the explicit objectives of the course, this was a result and positive consequences that happen in the process." (I2)
6. **Value Co-Creation through Innovation Ecosystems:**	In innovation ecosystems, value is co-created through collaborative relationships among universities, companies, government entities, and civil society. This co-creation, exemplified by the Alliance for Innovation and Pacto Alegre, generates benefits across various levels and contributes to the overall success of the ecosystem.	With the alliance there is a discussion about the expectation that a successful project could generate valuable learning about how to unite diverse institutions and actors in an innovation ecosystem. (I5) The three universities working together, cooperating for something bigger, forgetting that they were "competitors" (I4)

Source: Elaborated by the author

The remarks underscore the pivotal role of universities in innovation ecosystems, particularly in regions like Porto Alegre. Universities are key knowledge generators and contributors to workforce development, influencing technological progress and economic growth. Their neutral role and legitimacy foster trust, exemplified by the successful Alliance for Innovation model.

The importance of breaking barriers and fostering healthy competition for innovation is highlighted, as seen in initiatives like Pacto Alegre. The cultivation of an innovation culture within universities, exemplified by the Alliance for Innovation, positions innovation as a fundamental value in academic pursuits.

Lastly, the propositions emphasize the collaborative nature of value co-creation in innovation ecosystems. The examples of the Alliance for Innovation and Pacto Alegre showcase how collaborative relationships across universities, companies, government entities, and civil society yield multi-level benefits, contributing significantly to the overall success of the innovation ecosystem.

5.1 Role of the university and the MBA in Innovation Ecosystem

As previously discussed in this work, the university plays a central role, being perceived as a fundamental pillar in the training of talents and the generation of knowledge. According to Etzkowitz & Leydesdorff (2000), universities are institutions shaping research activities, supplying qualified labor, and contributing to the generation and dissemination of knowledge in socioeconomic systems. Mowery & Sampat (2006) highlight universities as participating agents in regional development through direct and indirect contributions to productive structures.

Schaeffer et al. (2018) emphasize that universities extend their contributions beyond teaching activities. In the 21st century, universities, as noted by Ferguson & Fernández (2015), play central roles in collaborating with companies, industries, and governments for skill development in various economic contexts. The changing landscape requires universities to contribute actively through human capital, research, patents, and the development of new knowledge-intensive businesses (Heaton, Siegel & Teece, 2019; Schaeffer et al., 2018; Etzkowitz, 1998).

While universities exhibit an entrepreneurial character, their impacts often encounter geographic limitations, as highlighted by Cowan & Zinovyeva (2013). This limitation is influenced by the specific characteristics of the innovation ecosystem in which they operate. Due to differences in economic, socio-cultural, and technological aspects of the territory, universities play diverse roles in their missions, including teaching, research, and extension. Despite pronounced variations between emerging and developed countries, universities have been adaptive, evolving into increasingly important and participatory actors in regional development, as noted by Trippl et al. (2015).

The in-depth analysis of the university's role within the innovation ecosystem, drawn from insightful interviews, unveils a nuanced and pivotal understanding of this

actor in the landscape of transformation and development. I3 underlines the university's significance, stating, "The university stands as a crucial pillar, extending beyond its educational role to actively propel innovation and foster regional development." Throughout the interviews, a spectrum of functions and distinctive characteristics emerged, intricately defining the multifaceted role of the university

I1 underscores the pivotal role of universities within the entrepreneurial ecosystem (EI), specifically highlighting their proactive and foundational contributions to the Pacto Alegre initiative. I1 says: "I think that if we look at the Innovation ecosystem and examine the role of universities, in the case of Pacto Alegre, the universities have a pioneering role, a role of provoking, seeking to structure. The three universities were the ones seeking to structure our IE."

Thomas et al(2020) argue that universities can motivate and empower regional stakeholders to reflect and act on the collective needs of regional development to accelerate the resolution of large-scale social problems. So, universities act as catalysts for regional transformation by fostering a collaborative, reflective, and action-oriented approach among stakeholders. This collaborative effort is seen as instrumental in accelerating progress and finding innovative solutions to large-scale social problems within the regional context.

In contemplating the dynamics of institutional efficacy and leadership within a university, interviewee 4 states that:

> The legal entity will do absolutely nothing, right? It's the CPFs (individuals) who do things, so if the leadership of that institution is proactive and believes, right? The institution will be that. If the leaders don't believe and aren't protagonists, the institution won't be a leader and won't be a protagonist. So, it's nothing more than an institution; a university expels the protagonism of its leaders.

This sentiment resonates with Senge's (1990) concept of a learning organization, articulated in "The Fifth Discipline." Senge advocates for a paradigm where organizational learning is intricately linked to the learning of individuals within the organization.

Moreover, Schein (1985) exploration of organizational culture and leadership provides further support to this perspective. Schein contends that leaders play a

pivotal role in shaping and influencing organizational cultures. The values, behaviors, and proactive stance of leaders significantly impact the collective identity of an institution.

Following the same logic, I6 asserts:

> "The role of the university, we often look at the faculty and the leaders who are faculty members; they are the ones who build bridges. It is necessary to work from a Mode 2 perspective of knowledge production. It is about understanding that the university is indeed a space for qualified training, and it has to look at the market, but that is too little; it's asking very little of such a powerful agent. It needs to go beyond the market; the university is not always in connection with the market because sometimes its role, it has a different time frame, it has different competence as well, but certainly, it has the know-how for that." (I6)

The way universities function is changing, as different universities explore how to fill in their role. Universities are becoming active players in their communities, contributing to the quality of life and regional well being, adding value to regional development processes, and anchoring the importance of knowledge in the regional innovation ecosystem. Traditionally, universities play societal roles relating to disseminating knowledge, discovering new knowledge, and societal participation. The importance of a more active role is expanding, and requires universities to rethink how this can most effectively be fulfilled (Markkula & Kune, 2015)

The need for universities to go beyond traditional teaching roles and take on a more active, entrepreneurial, and transformative role in their respective contexts is also brought by I4:

> I think it's a very limited role if the university focuses solely on teaching; that's a fundamental role of the university. I believe that today, the role of a university is to be entrepreneurial, modern, to be a protagonist, leading, creating connections, leading projects, and so on, right? So, the university needs to make a greater contribution, right? It can't be a university that's just closed within its four walls, thinking it will teach in a world where artificial intelligence already does that practically. The university has to step out of itself and be the main protagonist and agent in the transformation of a region; that's the role I believe in (I4).

The speaker expresses a belief that the traditional role of the university, centered solely on teaching, is too limited. Instead, the modern university should embrace a more expansive role. The suggested roles include being entrepreneurial, contemporary, and taking on a leading and proactive stance.

The interviewee 2 brings a consideration that the university needs to have more active professors in the innovation ecosystem. "I'm talking about institutional representation in discussion forums. Representing institutionally to participate in discussions at the City Council. Representing institutionally in technical working groups for the formulation of innovation laws." The interviewee also explains that there is a need for professors connected with the demands, and also they should occupy spaces. And they will be the seeds to sow projects and deliverables.

Thus, the professor is seen as a crucial actor who not only represents the university but also acts as a catalyst for initiating and nurturing innovative projects. This perspective aligns with the broader theme of universities playing an active and participatory role in driving innovation and contributing to the development of the innovation ecosystem.

Interviewee 2 brings another point of view about the role of the university in the innovation ecosystem:

> I think the university has two main roles. One is to facilitate connections because many people move through the university due to the transition from knowledge to resources. The university has an interest in developing knowledge, so it is a somewhat more neutral actor in relationships. And it needs to exercise this role by facilitating processes. I think that's the first point. The second point, which also comes from this neutrality, is that the university has the obligation to exert pressure. It has to ask, "Okay, but does this project impact the same group that already makes money from the city, or will it bring more social development?" (I2)

> I believe that the neutrality the university has to exercise involves these two elements: making the ecosystem spread as widely as possible, not staying in a concentrated group. Also, by doing this, it creates trends and facilitates connections and renewals through the network it can operate within (I2)

It is possible to infer that the university serves as a facilitator of connections, acting as a neutral player in relationships. This neutrality allows it to exercise its role in developing knowledge and resources, fostering a broad and diverse network. The emphasis on spreading the ecosystem widely rather than concentrating in specific groups indicates a commitment to inclusivity and avoiding exclusivity. This reflects a call for responsible and ethical engagement from the university, pushing for projects that have a positive impact on the wider community.

Thus, "The impact of the university goes beyond teaching, reaching economic development and innovation." I10. Universities, recognized as Hubs of Knowledge, Education, Training, and Research, transcend their traditional role in education, reaching broader spheres such as economic development and the promotion of

innovation (I10). In this multifaceted context, these institutions not only transfer knowledge but also actively catalyze progress, positively influencing various sectors through the dissemination of knowledge, the training of qualified professionals, continuous education, and innovative research (Ferguson & Fernández, 2015).

Moreover, universities have assumed various novel responsibilities in recent times. Among these, the role of a knowledge exchange platform provider has gained significant prominence. This role, according to Markkula & Kune (2015) emcompasses the following components:

1. Connection: Universities are tasked with bridging generations by engaging students, lifelong learners, and collaborating closely with primary and secondary schools to foster discovery learning. They also facilitate connections between people and societal processes, as well as link knowledge to regional and societal learning processes, while fostering collaboration among ecosystem partners.
2. Knowledge: Universities aim to disseminate knowledge throughout the region, enhancing intelligence and smartness in traditional senses of understanding and knowing.
3. Learning: Education extends beyond the traditional curriculum to encompass learning from practical experience, within the ecosystem, and about the ecosystem. This learning should be accessible to all within the ecosystem.
4. Anticipating: Universities must proactively anticipate and address emerging challenges before they escalate. This requires maintaining foresight, conducting research in advance, and providing early-warning systems to serve regions and communities effectively.
5. Generations of the Future: Universities play a vital role in preparing young people for diverse future opportunities by guiding, coaching, creating conducive conditions, enhancing competencies, and building capacities.

In essence, universities serve as catalysts for positive change, driving innovation, fostering connectivity, and nurturing the leaders of tomorrow. Their multifaceted roles underscore their importance as pillars of knowledge, learning, and anticipation in the modern world.

In this context, the university is recognized as a center of knowledge, research, and development, playing a fundamental role in integrating teaching and research to foster innovation. As highlighted by E3, the university stands out as the primary source of innovation, driven by advanced research and academic discoveries.

This perspective aligns with the vision expressed by I5, emphasizing the need for the university to be "more than just a place for academic research," advocating for the importance of academic environments that encourage applied research and collaboration among professors, researchers, and students. The idea is that the integration of teaching with research creates an environment conducive to the emergence and development of innovative ideas.

I6 expands on this idea, emphasizing the importance of the university being a "space where students not only absorb theory but also apply this knowledge in practical projects. This approach creates a crucial bridge between academic learning and the dynamic demands of the innovation ecosystem."

I9, in turn, highlights the vital role of the university in providing quality education, especially through programs like the MBA, which serves as an effective bridge between academia and the needs of the productive sector. Thus, by integrating teaching, applied research, and collaboration, the university emerges as an essential driver in fostering innovation and meeting market demands.

There is a consensus that the university should align itself with the demands of the productive sector. The initiation of the MBA, as highlighted by E4, serves as a prime example of an innovative response to these demands.

Respondents have identified challenges, as articulated by E5: "The integration between the university and the private sector encounters obstacles such as bureaucracy and differing organizational cultures." These noted challenges, including bureaucracy and cultural disparities, resonate with the barriers outlined in the literature concerning technology transfer and collaboration between academia and industry (Perkmann et al., 2013).

The formation of partnerships and alliances, as deliberated by the interviewees, underscores the increasing significance of collaboration between academia and industry. Thus, many interviewees have provided comments and expressed agreement that the university should actively engage in networks and

collaborations. I7 emphasizes: "The university cannot thrive in isolation; a collaborative ecosystem is imperative."

In short, the university plays a central role in the innovation ecosystem, encompassing advanced research, practical education, and a direct connection with the needs of the productive sector. Facing challenges and fostering transformative learning, the university is seen as a vital agent in promoting innovation and regional economic development.

However, it is worth noting that the importance of context has a significant influence. Thomas, Faccin, and Asheim (2020) emphasize that in countries where public administration lacks funding for innovation ecosystems due to various complex issues, universities can assume a leadership role. This is particularly relevant in regions with weak institutions, poverty, productivity deficits, corruption, and limited capacities. The neutrality, accumulated knowledge, and experience of universities make them suitable for playing a local leadership role, especially in emerging economies. However, it's crucial to recognize that the participation of universities in emerging economies differs significantly from that in developed countries due to distinct structural, financial, and cultural aspects.

The role of universities in innovation ecosystems also varies between emerging and developed countries. Emerging economies often rely on government actors for shaping innovation policies, while developed countries emphasize strong university-industry connections that drive collaborative efforts. Basic ecosystem development strategies, such as identifying needs, engaging stakeholders, seeking funding, and defining knowledge absorption objectives, are prominent in emerging economies. In contrast, developed countries employ more advanced strategies, focusing on technology transfer, internationalization, and entrepreneurship through diverse training courses (Mello, Faccin, Da Silva, 2022).

The contrast continues in the production of artifacts, with universities in emerging countries primarily generating limited internal-use items with restricted connections to technology parks. Conversely, developed countries witness active university-industry partnerships that lead to increased commercialization, licensing, and spin-offs, but in emerging countries, universities play a crucial role in creating a skilled workforce, orchestrating ecosystem development, seeking partnerships, and emphasizing social aspects. Despite these contributions, they are less attractive to

companies compared to their counterparts in developed economies (Mello, Faccin, Da Silva, 2022).

In the context of the innovation ecosystem of Porto Alegre, the interviewees highlighted the importance of the structure of the MBA in Innovation Ecosystem. They emphasized aspects such as interdisciplinarity, experienced professors, active members of the innovation ecosystem, a practical approach, the use of international and national case studies, integration with the business environment, visits to the innovation ecosystem of Porto Alegre, and, of course, collaboration among professors from the three universities.

An MBA being launched "surfing the wave", of the alliance and the joyful pact. That was important. the time it happened. Also, the possibility of saying that we would have professors from the three institutions was also something sensational, and on top of that they were reference professors, not just academic ones, but references in the real world (I7).

The MBA in Innovation Ecosystem, according to the assessment by I10, is perceived as "a project that transcended conventional boundaries, generating a systemic impact that surpasses the scope of academic publications, even achieving notable international repercussions, with several publications on the subject" (I10). Meanwhile, I8 highlights the emphasis on leadership development and the establishment of a robust network of partners, thus showcasing the tangible results achieved by the MBA.

Avolio and Hannah (2020) emphasizes the importance of developing leaders who can drive positive change for people, profit, and the planet. Additionally, the importance of forging strategic partnerships in fostering innovation is supported by Cummings and Kiesler (2008), who discuss the benefits of prior experience in reducing collaboration barriers in interdisciplinary research.

Despite the global success of the program, I8 mentions a specific challenge related to the difficulty of consolidating a second MBA cohort. This challenge is attributed to the in-person format of the course, combined with the complexity of involving public managers from more distant regions. This observation is supported by I9, who emphasizes "the additional challenge of attracting public managers and professionals from the interior, given the in-person nature of the MBA."

Notwithstanding the challenges faced, I8 reaffirms the recognition of the MBA as a successful project, surpassing expectations and providing significant visibility to

the alliance. His additional considerations about the training of ecosystem orchestrators underscore the profound impact of the MBA not only in theory but also in practice, shaping professionals capable of leading and driving effectively in complex innovation environments

The MBA in Innovation Ecosystem emerged in response to the growing demand for professionals with interdisciplinary skills, serving as an effective bridge between academia and industry and filling a identified gap in the market (I6). Designed to go beyond traditional educational barriers, the program emphasized interdisciplinarity, leveraging collaboration among three universities to provide a unique approach, enriching students' education with diverse perspectives (I7).

The belief in developing leaders capable of influencing ecosystems is highlighted as a fundamental principle of the MBA (I9). The interaction among professors from different institutions is considered essential to create an innovative educational experience, reinforcing the importance of interinstitutional collaboration in professional development (I5,I6,E8).

The mentioned impacts of the MBA include the development of innovative skills, the stimulation of critical thinking, and the contribution to the preparation of professionals for dynamic environments (I8). However, challenges were identified, such as resistance to change, the need for continuous adaptation, and the integration of different profiles of students and professors (Impacts and Challenges in Implementation).

Even in the face of initial difficulties, especially of a bureaucratic nature, the MBA demonstrated resilience in overcoming these obstacles, a challenging yet crucial process for the program's success (I8). In this context, I8 highlights the MBA as an initiative to shape transformation agents in innovation ecosystems, emphasizing the active role of universities in leadership formation (I8).

I3 reflects on the need for universities to prepare professionals capable of leading and innovating in different contexts, emphasizing the educational role in preparing individuals for multifaceted challenges.

Universities emerge as crucial actors in leading the innovation movement, possessing a city development agenda and the ability to act more neutrally, promoting the advancement of the innovation ecosystem.

> The university is interested in developing knowledge. So she is a slightly more neutral actor in relationships. And it's accurate to exercise this by facilitating processes. I think this is the first point. And the second point that also comes from this neutrality [...] the university has an obligation to put pressure on. She has to put OK, but does this project impact the same group that already earns money from the city or will it bring more social development? (I10)

Therefore, it is worth clarifying that education is a political act because it aims to transform reality. Transformative education is one that leads individuals to question the status quo and fight for a more just society." (Freire, 1970).

The MBA and other initiatives have the fundamental goal of transforming mindset, fostering a more collaborative and innovative approach. Traditionally, there has been an emphasis on training entrepreneurs for the ecosystem. However, today, there is a new need to educate ecosystem builders in innovation-related themes. This gap arises from an innovative model, resulting in a shortage of individuals equipped with these specific skills (I11).

The MBA emerges as a response to this emerging demand, aiming to shape ecosystem builders by providing essential skills to drive innovation. Smith (2018) posits that innovation ecosystems require individuals with diverse skill sets beyond traditional entrepreneurship, echoing the sentiment expressed by interviewee I11. Beyond academic content, the importance of networking among MBA participants is highlighted, recognizing the significance of connections and collaborations in the context of training in the construction of innovative ecosystems. Some of the interviewees related that after the course, created some project together. This approach seeks not only to develop theoretical knowledge but also to cultivate practical skills necessary to lead and effectively contribute to innovative environments (I11).

Building on this perspective, Jones (2020) emphasizes the role of networking and collaboration in innovation ecosystems, stressing that practical skills and partnerships are essential for driving innovation. Some interviews (I7) and (I8) share the vision that the MBA goes beyond the conventional, seeking a transformative and practical approach:

The interviewee underscores that the MBA program goes beyond traditional education paradigms. They emphasize a focus on transformative learning that extends beyond classroom boundaries. This approach seeks to cultivate practical skills among students, enabling them to apply their knowledge effectively in

real-world settings. Additionally, the interviewee emphasizes the importance of forming a network of professionals capable of actively contributing to innovation ecosystems.

This suggests a holistic approach to education, where networking and practical application are integral components alongside theoretical learning. I7 says: "This MBA goes beyond the conventional. We aim for transformative learning that extends beyond the confines of the classroom, seeking to develop practical skills and form a network of professionals capable of contributing effectively to ecosystems."

Furthermore, the notion of forming a network of professionals capable of contributing to innovation ecosystems echoes the ideas of Etienne Wenger, who introduced the concept of communities of practice. Wenger argues that learning is inherently social and that individuals develop their professional identities through participation in communities where they can engage in meaningful interactions and collaborative problem-solving (Wenger, 1998) as I8 explains: "Our contribution to the ecosystem transcends professional training. We are building a strong network of partners, ready to collaborate and drive innovation."

By surpassing the limits of the traditional MBA and focusing on transformative and practical learning, the program not only aims to develop skills in participants but also to build a robust network of professionals and partners. This holistic approach emphasizes a commitment not only to individual development but also to the effective contribution to ecosystems, fostering innovation collaboratively and broadly. The MBA extends beyond the classroom, positioning itself as a catalyst for the advancement and strengthening of innovation environments.

Moreover, the findings regarding students' perceptions of their role within the innovation ecosystem underscore the need for a more inclusive approach to education. Authors like Paulo Freire emphasize the importance of participatory education, where learners are active participants in the learning process rather than passive recipients of knowledge (Freire, 1970). Integrating students as active agents within the innovation ecosystem not only enhances their own learning experience but also enriches the ecosystem by tapping into their diverse perspectives and talents.

Regarding the academic environment with a special course created within an innovation ecosystem, the evidence gathered by this study demonstrates that professors and students have different perspectives regarding the students' role as active agents contributing to the ecosystem. Although they are perceived as

important agents, they feel diminished in the recognition of their contributions. It shows the need to a careful look into the students role, not only to their own development but impacting in the ecosystem

It is observed that, when discussing the role of the university in the context of the innovation ecosystem, interviewees often direct their attention to elements such as teaching, research, and extension, in addition to the normative and prescriptive functions performed by executives and leaders. However, this focus seems to be primarily on internal stakeholders, neglecting to include students as active participants in this university role within the innovation ecosystem.

This oversight is particularly relevant in the context of specialized courses within innovation ecosystems, where students play a crucial role as active agents of change. As highlighted in recent studies (Hernández et al., 2020; Carayannis & Campbell, 2010), students are increasingly recognized as genuine agents of transformation within innovation ecosystems, contributing to knowledge dissemination, entrepreneurial activities, and industry collaborations.

Surprisingly, this dynamic changes significantly when the discussion turns to the MBA in Innovation Ecosystem. In this specific scenario, a significant portion of the interviewees begins to recognize and emphasize the crucial role of students as true agents of transformation. Their responsibilities as knowledge disseminators in the innovation ecosystem are highlighted, suggesting a noticeable shift in perspective regarding the role of students.

Given this observation, some inferences can be drawn. A plausible interpretation is that this shift in focus is not merely a specific characteristic of the case but rather a reflection on the interaction between the university and the innovation ecosystem. The careful selection of the target audience for the MBA may have consciously aimed to attract members directly involved in the ecosystem, promoting a more holistic and participatory view of the students' role.

However, this change also raises intriguing questions about the traditional perception of students in the realm of innovation. The possible interpretation that students are predominantly seen as knowledge recipients rather than active participants in building the innovation ecosystem suggests a gap in understanding their transformative potential. This specific evidence leads to the third proposition:

Proposition 3: universities must enhance students' role in the ecosystem in order to offer them the spotlight they deserve as active and relevant actors.

The evidence shows that students may feel underused and underestimated in an environment where they work alongside professors and companies as well as government entities, which provides an environment full of many powerful actors, or so they seem to students as they are just at the beginning of their own professional journey. This leads to an ecosystem that downplays the students as a lesser role, whereas they may possess creativity and willpower to achieve great potential within the ecosystem, given the right push and the open possibilities for their complete participation. It may seem far stretched, but the evidence showed this remark and it is important to bring it forth, although it is not clear how and the possible outcome, it seems a possible path to bring students as closer actors into the IE.

In the rapidly evolving landscape of higher education, universities are increasingly recognized as pivotal hubs within the broader innovation ecosystem. As emphasized by Lundvall (2006), universities play a vital role not only in disseminating knowledge but also in nurturing innovation and entrepreneurship among students. This perspective underscores the importance of universities in enhancing students' roles within the ecosystem, positioning them as active and relevant actors in driving societal and economic change.

Furthermore, Quaye and Harper (2015) advocate for meaningful student engagement within higher education institutions. They argue that fostering student engagement goes beyond traditional classroom activities, necessitating active collaboration with peers, faculty, and external stakeholders. By empowering students to take on active roles within the university ecosystem, institutions can enrich the learning experience and better prepare students for their future as leaders and innovators.

In light of these perspectives, it becomes evident that universities must prioritize enhancing students' roles within the ecosystem. By offering students opportunities for active engagement and fostering a culture of innovation and entrepreneurship, universities can empower students to become dynamic contributors to the knowledge economy and agents of positive change in society.

Thus, there is an urgent need to reassess and broaden the view of students as active agents in the innovation ecosystem. This reconsideration not only highlights

the vital contribution of students to academic development but also underscores their ability to positively influence the advancement and dynamics of the innovation ecosystem as a whole. This contribution broadens the literature already existing on innovation ecosystems, as it brings to light a less explored topic: students' role. As the university is an integral part of the triple helix model, students are always part of an innovation ecosystem, therefore thinking about them and facing their differences from other individual actors (professors, entrepreneurs, government agents) is needed. Not only is there a generational gap, many times, but also a power gap, nevertheless the students are the actors with less investment in the innovation ecosystem, therefore, they may feel freer to experiment, create, transform, modernize in unconventional ways. So, better understanding and validating the students as an intrinsic and indispensable part of the ecosystem, offering them space as necessary for their full participation is not only advisable, but highly recommended, as the evidence of this research supports.

Chart 11 - Nortworthy remarks: role of the university

Considerations	Remarks	References
University as a catalyst for regional innovation	Universities, recognized as hubs of knowledge, research, and development, play a pivotal role in driving regional innovation by integrating teaching and research, fostering interdisciplinary collaboration, and actively engaging with the innovation ecosystem.	The MBA course in innovation ecosystem was a strategic project of Pacto Alegre, aiming to qualify professionals engaged in local innovation ecosystems. The course captured students working in the sectors in which they were inserted, mobilizing and qualifying them to effectively contribute to regional development. Thus, universities play a crucial role in driving and strengthening innovation in their regions (I6)
Leadership Impact on Institutional Efficacy	Leadership within a university significantly influences its efficacy and role within the innovation ecosystem. Proactive and visionary leaders contribute to the university's effectiveness in fostering innovation, while a lack of	Their leadership extends beyond traditional academic functions, allowing them to orchestrate the evolution of these ecosystems into environments fostering the creation and transfer of cutting-edge knowledge and transformative technologies. Actively engaging in initiatives that bridge academia and industry, universities contribute

	leadership engagement may limit its impact.	to the dynamic development of innovation ecosystems, facilitating the exchange of disruptive ideas and advancements (León, 2013; Thomas et al., 2020; Faccin et al., 2022). The program not only trains professionals, but also activates leaders and shares mindsets to drive innovative actions in the region. This approach highlights the impact of leadership in forming collaborative networks and promoting regional innovation (I5).
University's role beyond teaching and researching	The university should extend its role beyond traditional teaching, embracing an entrepreneurial and transformative stance. This involves being proactive, leading projects, building connections, and actively participating in the broader innovation ecosystem.	Universities play central roles in collaborating with companies, industries, and governments for skill development in various economic contexts. The changing landscape requires universities to contribute actively through human capital, research, patents, and the development of new knowledge-intensive businesses (Heaton, Siegel & Teece, 2019; Schaeffer et al., 2018; Etzkowitz, 1998).
Active role of professors in the innovation ecosystem	Professors play a crucial role as active agents within the innovation ecosystem, representing the university in discussions, forums, and working groups. They act as catalysts for initiating and nurturing innovative projects, contributing to the university's broader impact.	Professors were deeply involved in actions within the ecosystem, which made them legitimate witnesses and authorities in their respective fields. This was a key element in the program's success (I2) The program's teaching staff was extremely qualified, including people who were references in the history of innovation in Rio Grande do Sul (I6)

Neutrality and ethical engagement of Universities	Universities, as neutral actors, should facilitate connections, exert pressure for social development, and avoid concentration in specific groups. Ethical engagement in innovation ecosystems involves spreading knowledge widely, fostering inclusivity, and promoting projects with positive social impacts. In regions with weak institutions, poverty, productivity deficits, corruption, and limited capacities, universities can assume a leadership role in innovation ecosystems, leveraging their neutrality, accumulated knowledge, and experience for local development.	the university has a neutral role in relations and needs to exercise this by facilitating processes. So the university must pressure and question the ethics of projects that impact the community, evaluating whether they only benefit certain groups or whether they bring broader social development. This neutrality involves making the ecosystem spread out, not concentrated in specific groups, and facilitating connections and renewals. This ethical and neutral stance of the university is seen as fundamental to ensuring that development is equitable and benefits society as a whole (I10)

Source: research data

So, as presented in the Chart 11, Leadership is a decisive factor influencing a university's efficacy within the innovation ecosystem. Proactive and visionary leaders play a critical role in enhancing innovation efforts, while a lack of leadership engagement may limit the university's overall impact. As universities redefine their roles beyond traditional teaching, adopting an entrepreneurial and transformative stance becomes imperative. This shift requires proactive leadership, involvement in innovative projects, and active participation in the broader innovation landscape.

Professors emerge as central agents within the innovation ecosystem, representing the university in discussions, forums, and working groups. Their role as catalysts is crucial for initiating and nurturing innovative projects, contributing significantly to the university's broader societal impact. Moreover, universities, as neutral actors, should actively facilitate connections, ethically disseminate knowledge, and champion projects with positive social impacts, fostering inclusivity.

In regions grappling with weak institutions, poverty, productivity deficits, corruption, and limited capacities, universities can step into a leadership role within innovation ecosystems. Leveraging their neutrality, accumulated knowledge, and experience, universities become instrumental in driving local development and addressing societal challenges.

5.2 Transformative learning and the innovation Ecosystem

Transformative learning represents a distinctive educational approach with the primary objective of instigating profound shifts in how learners perceive and engage with their surrounding world. This pedagogical philosophy, as articulated by Mezirow & Taylor (2011), operates on the premise of facilitating change by urging learners to critically scrutinize and evaluate the authenticity of their deeply ingrained assumptions concerning their connections to the world. It transcends conventional learning by not solely focusing on the acquisition of new factual knowledge but by deliberately prompting individuals to reevaluate and reshape their core beliefs, resulting in a more comprehensive and holistic understanding of the subjects under study.

In this perspective, transformative learning is not a passive reception of information but an active process that challenges learners to question not just the content they encounter but also the foundational principles that shape their worldview. This critical questioning, essential to the transformative learning approach, contributes to the development of individuals capable of nuanced analysis and conscious evaluation. In essence, transformative learning cultivates a mindset that goes beyond rote memorization, fostering a deeper engagement with knowledge, a heightened sense of self-awareness, and the ability to navigate the complexities of the world with a more open and adaptive perspective (Mezirow & Taylor, 2011).

Exploring the contribution of transformative learning, mediated by the role of the university, to the innovation ecosystem is crucial. This objective aims to deepen our understanding of the transformative impact that universities can have. They not only provide knowledge but also play a central role in shaping students' perspectives and interactions with the world, becoming agents to face complex challenges.

Several scholars have highlighted the pivotal role of universities in fostering transformative learning experiences and contributing to innovation ecosystems. Mezirow (1991) pioneered the concept of transformative learning, emphasizing how it involves a profound shift in perspective and worldview. Building on Mezirow's work, Cranton (2006) further explored transformative learning in higher education, emphasizing its potential to empower learners to critically reflect on their assumptions and enact meaningful change.

Moreover, authors such as Kezar and Maxey (2014) have researched the role of universities in innovation ecosystems. They argue that universities serve as catalysts for innovation by facilitating interdisciplinary collaboration, knowledge exchange, and experiential learning opportunities. Similarly, Etzkowitz (2003) introduced the concept of the "entrepreneurial university," highlighting how universities can actively engage with industry and society to drive innovation and economic development.

The interviews conducted, both with professors and students of the MBA course, unveiled the perspectives of key individuals involved in both the conception and implementation of the course. Regarding the professors, their insights provided valuable understanding of the process of designing and executing the program. They shared their experiences in course development, highlighting the challenges faced and the strategies employed to ensure an effective approach.

Shulman (2005) has emphasized the importance of faculty development in enhancing teaching and learning practices. Through reflective practice and collaboration, professors can refine their pedagogical approaches and create transformative learning experiences for students.

On the other hand, the students' perceptions, having gone through the entire curriculum of the course, offered a unique understanding of how the educational proposal was received in practice. Their opinions addressed not only the effectiveness of the content but also aspects such as engagement, the practical applicability of acquired knowledge, and the perceived impact on their worldviews.

Drawing on the work of authors such as Mezirow (1997), Taylor (2000), we can understand the significance of student perspectives in assessing the efficacy of transformative learning experiences. These scholars highlight the importance of students' critical reflection and sense of agency in the transformative learning process.

Together, the interviews with professors and students provided a comprehensive and holistic view of the course, enriching our understanding of its development, implementation, and impact on the academic community. This aligns with the principles of participatory evaluation advocated by authors like Cousins and Earl (1995), emphasizing the value of engaging stakeholders in assessing educational initiatives and fostering continuous improvement.

One of the highlighted aspects during the interview was active, collaborative, and networked participation. The emphasis on the joint construction of the MBA involved stakeholders, coordinators, and professors from the three universities (PUCRS, UFRGS, and UNISINOS) from its conception and formulation to the jointly conducted applications. This sought to create a conducive environment for change, promoting a holistic and interconnected view of knowledge.

Multiple interviewees have attested to the series of meetings convened among representatives from the three universities and stakeholders from the quadruple helix to facilitate the construction and advancement of the course. This cooperative endeavor reflects the essence of interorganizational collaboration, as advocated by Powell et al. (1996), which underscores the significance of fostering networks for learning and innovation.

I7 explains that:

> “cooperation was completely ingrained, right? Because besides cooperating to structure the program, it was a program designed by many hands, right? So, I would say these are the major differentiators, right? The first differentiator is the fact that it is genuinely collaborative in terms of program conception, in the way courses are offered, and the second, it has a very applied vision to the regional and local context, right? That's what we were aiming for.”

This perspective aligns seamlessly with the concept of situated learning, which underscores the importance of acquiring knowledge and skills within authentic contexts and communities of practice, as proposed by Lave and Wenger (1991). By engaging in collaborative efforts within the framework of the quadruple helix and involving stakeholders from various sectors, the construction and development of the course not only leverages diverse expertise but also promotes an environment conducive to situated learning, where learners can actively participate and apply their knowledge in real-world settings.

The program's ingrained spirit of collaboration, extending beyond structuring to involve collective design efforts. Two key differentiators are highlighted: genuine collaboration in program conception and course delivery, emphasizing a holistic approach, and a highly applied vision tailored to the regional and local context. In essence, the program stands out for its comprehensive collaborative ethos and practical, region-specific focus.

> "I think that considering transformative learning in a theoretical sense during the course design was not explicitly considered. However, we certainly thought about what we would provide, what they would learn, and how it could impact and transform. The applied project, in my understanding, was a way for us to deliver something to the ecosystem, and that was it, perhaps the only viable way to do it was by having individuals go into the ecosystem and perceive its challenges. So, there was a lot of consideration given to their experience." (I2)

> "Every six months, there was an immersion. So, the idea was to experience, to see things, to talk, to exchange more ideas in these environments, and it ended up being virtual. But again, I think this is also something worth mentioning about the project because pedagogically, it considered this aspect of exchange, connection, and the indirect effects of forming a network, right? So, I believe that placing immersions and experiences along the way also demonstrates a focus on experiential, transformative learning. Perhaps the success in contributing something to the ecosystem was because there was a strong emphasis on developing the students."(I2)

According to I7 and I8 the transformation of an applied course within an MBA program to emphasize interaction, innovation, and collaboration. Initially, there were concerns about facilitating meaningful interaction, but efforts were made to develop a final project focused on building an innovation ecosystem. The program prioritized practicality, demonstrated through immersions to universities and technological parks, which enabled students to connect with researchers and leaders. Ultimately, the course aimed to foster better relationships between academia, business, public institutions, and society, highlighting the importance of collaboration within the innovation ecosystem.

> There was a concern about it being an applied course where people would truly have that interaction. In the end, for the final project, we did all this work to try to make them develop the innovation ecosystem as well. So that they also became transformers, agents of transformation in some way. There was also this logic of inviting recognized individuals in the ecosystem and sharing the disciplines, right? So, it was a discipline that usually operated in a shared manner (I7).

> The MBA prioritized practicality, the applied context. So, I would say here that the idea of immersions, visiting the three universities, getting to know technological parks, exploring the innovation environments of universities, meeting researchers, and the main leaders, also promoted in students some possibilities of how to connect, right? And establish a better relationship between university, business, university, public power, university, and society. These connections also became important." (I8)

The MBA program exhibits a comprehensive and applied approach to transformative learning. The emphasis on practical experiences, such as applied projects and virtual immersions, underscores a commitment to real-world impact and

the development of a strong network. The program's collaborative nature, involving recognized figures from the ecosystem, further enriches the learning experience. Additionally, the incorporation of immersive activities, like visits to universities and technological parks, highlights a dedication to hands-on learning and fostering connections between academia, industry, and society. Overall, the program appears to prioritize experiential, transformative education with a focus on active student participation and real-world applicability

> The goal was to train and prepare leaders for regional ecosystems and innovation, right? Who could then leave there, implement ideas, and, right? Advance in their regions. So, I think this was an important point, right? And also disseminate a bit more of this culture of innovation, right? (I4)

> The course managed to bring, capture, right? The so-called students who were dynamic actors on the sites where they were operating, right? They were also very protagonists. They wanted, eh, to understand specificities to qualify their performance. They liked the proposal, engaged with it, so there was a communion of interests and a will to do, and awareness that they were participating in something very special (I7).

This perspective resonates with the ideas of educational change and leadership emphasized by Fullan (2007) and Senge (1990). Fullan (2007), in his work on educational change, stresses the significance of leadership in orchestrating transformative shifts within educational systems. He advocates for a holistic approach to leadership that encompasses vision-setting, capacity-building, and fostering a culture of innovation, collaboration and commitment to enact positive change within their regional contexts.

Similarly, Peter Senge's work on systems thinking and organizational learning underscores the importance of developing leaders who can navigate complex environments and facilitate systemic change. Senge emphasizes the role of leadership in creating learning organizations that continuously adapt and innovate to address evolving challenges.

Some interviewees highlight the active engagement of students, who became protagonists, seeking to understand local specificities. The common point is the perception that the course not only conveyed theoretical knowledge but also empowered students to be conscious agents of transformative impact in their communities.

In terms of classroom methodologies and the role of the professors, the interviewees generally emphasize the reputation and qualifications of the faculty.

> "We had in this faculty an extremely qualified team because some of those individuals were there telling the story of innovation in Rio Grande do Sul, right? We had a consultant, Piquet, right? He is the “godfather” of Pacto Alegre. So, there were professors who had more traditional methods, but that professor was so involved in a certain action in the ecosystem that it was a set of practical knowledge. So, in some classes, the use of more participatory methodologies was facilitated, while in other disciplines, not so much. But these contents were brought by professors who were at the heart of the subject, as witnesses who had legitimacy in what they were saying." (I7)

This observation aligns on effective teaching practices and the role of faculty in transformative learning experiences. Brookfield (2015) emphasizes the importance of faculty expertise and engagement in creating meaningful learning environments. Moreover, the use of participatory methodologies by certain faculty members resonates with the principles of student-centered learning advocated by Weimer (2013), which prioritize active engagement and collaboration in the classroom.

For some of the professors, the transformation of their students was evident during and after the course.

> "I believe there was a development of transformation; people realized and developed competencies to collaborate more, integrate into various networks, and generate learning. In this sense, I believe there was a transformation in competencies [...] of individuals to act as leaders or orchestrators of ecosystems.
>
> In this concept, it's about developing the person in their connection with space, with the social, and more. Based on the experience I witnessed throughout the process, having them at the beginning and then later on, I think this collective transformation was quite present. It was not only within the MBA group context but also the individual perception of each one outside the course, taking what they learned there. However, I don't have a quantitative indicator to provide; I can only speak from my perception.

Some of the interviewed professors highlight a notable development in people's transformation throughout the process. They emphasize that individuals perceived and developed competencies to collaborate more, integrate into diverse networks, and generate learning. There is a belief that a transformation occurred in people's competencies, enabling them to act as leaders or orchestrators of ecosystems. The underlying concept is the development of individuals in their connection with space and the social.

The experience of the interviewed professor, who followed the participants from the beginning to the end of the process, underscores the significant presence of

this collective transformation. It manifests not only within the MBA group context but also in the individual perception of each person in their external environment beyond the course. The emphasis is on the practical application of learning, carrying the lessons learned beyond the academic setting. Despite the absence of a quantitative indicator, the qualitative perception of the interviewed professor supports the idea of a meaningful transformation.

For students, when asked about the theme of transformative learning and the main transformations they could perceive through the course, all interviewed students highlighted some points they could learn and transform in some way.

The testimonials provided by participants offer profound insights into the transformative impact of the MBA program on their professional journeys and perspectives on innovation.

> "I was able to increase my position, let's say because today I am a specialist in innovation, so I believe that the MBA was what made a difference in my resume. It has already paid off just for the network we have until today, right?" (II12).

Participant II12 highlights how the MBA program elevated their professional standing by specializing in innovation. They attribute their career advancement and enhanced resume to the program, emphasizing the invaluable network they've cultivated as a significant payoff. They attribute this success to the program's emphasis on networking and specialization, as discussed by Granovetter (1995), underscoring the importance of broadening professional connections and acquiring expertise in emerging fields for career development. Overall, Participant II12's story illustrates the pivotal role of the MBA program in equipping individuals with the knowledge, skills, and networks necessary to thrive in dynamic professional environments.

In contrast, Participant I13 reflects on a fundamental shift in their perception of trust and its role in fostering connections and generating results. The course's emphasis on collaborative activities led to newfound confidence, ultimately altering their approach to work and yielding favorable outcomes.

> "The course definitely changed my way of seeing the issue of trust, mainly by developing activities together to generate results. Confidence that generates connections. Definitely, the course impacted and changed the way I work today. And so the result has been very favorable" (I13).

I16's testimony highlights the diverse backgrounds of individuals attracted to the MBA program, such as architects unfamiliar with the innovation ecosystem. This reflects the program's ability to appeal to a wide range of professionals seeking to expand their horizons. Witnessing participants like these architects leaving the course inspired to orchestrate ecosystem events underscores the transformative impact of the program in fostering proactive engagement within the innovation landscape.

> "I met people who were architects and had never heard of the innovation ecosystem. They left the course creating an event to dynamize and orchestrate the ecosystem, so I think the course brought a lot of baggage for many people, while for others, it just facilitated what they already knew" (I16).

The experience cited resonates with the concept of transformative learning, as discussed by Mezirow (1997) and Taylor (2000), wherein individuals undergo shifts in perspective and behavior as a result of new experiences and insights. This anecdote illustrates the program's ability to empower individuals from diverse backgrounds to become active contributors to the innovation ecosystem.

Moreover, the experiences shared by Participant I17 provide tangible evidence of the program's effectiveness in facilitating concrete outcomes. Some participants ventured into entrepreneurship by creating startups, while others transitioned into roles focused on innovation. This showcases the program's capacity not only to impart knowledge but also to catalyze action and career shifts within the innovation domain.

> "I use many tools that were given to me to apply within my company and my relationship with partner companies. Because this was something that was deconstructed in my mind, which I think is something that people don't realize much, but the new generation already has this more deconstructed, that is, eliminating competition and putting construction in its place… I entered feeling like an intern, and then I left feeling like a manager because from the moment I was given the opportunity to give my opinion, and I spoke, and these people who already have this credibility, right? They already have that stamp, like I went, I did, and my name is there. So, when you give an opinion, I want to say, 'Wow, really, congratulations, your opinion is even amazing.' It gave me confidence, changed me a lot in terms of confidence, both because I learned new things and because I confirmed things that I already believed before" (I18).

I18's reflection on the practical utility of the tools acquired during the program resonates with broader trends in contemporary business practices. Their observation about a generational shift towards collaboration over competition underscores the

program's responsiveness to evolving industry demands. Additionally, their journey from feeling like an intern to assuming a managerial role speaks volumes about the program's transformative impact on confidence and professional identity. According to Mezirow (1991), transformative learning involves a profound shift in perspective and behavior resulting from critical reflection on new experiences and insights.

The journey shared by Participant I19 sheds light on the realization of the vast distance still present in innovation. Their restlessness and subsequent commitment to driving innovation within the ecosystem highlight the program's capacity to inspire a deeper sense of purpose and urgency among participants. This underscores the program's role in empowering individuals to navigate the complexities of the innovation landscape and drive positive change within their respective domains.

> "I can say that during the course, I felt uncomfortable, restless because I think it showed me something like, how can I tell you? I don't know how to put it, but it's my restlessness that during the course, I realized how distant innovation is and how much distance still exists in innovation, how much needs to be done to bring it to people, to take it to people. That opened me up more to a horizon, like, 'Wow, we have to do a lot in the ecosystem,' and that also influenced my TCC" (I19).

Participant I19's reflection underscores the program's role in cultivating a sense of purpose and agency among participants, aligning with the principles of transformative learning and societal change (Kahane, 2010; Westley et al., 2013). Overall, these testimonials and reflections paint a vivid picture of the multifaceted impact of the MBA program, from broadening perspectives and inspiring action to fostering collaboration and instilling confidence, empowering individuals to thrive within the dynamic and ever-evolving innovation ecosystem.

Collectively, these testimonials and reflections paint a vivid picture of the multifaceted impact of the MBA program. From broadening perspectives and inspiring action to fostering collaboration and instilling confidence, the program plays a pivotal role in empowering individuals to thrive within the dynamic and ever-evolving innovation ecosystem.

Transformative learning is a learning process that leads to significant changes in the way of thinking, feeling, and acting. This learning is characterized by a change in perspective, a change in values, and a change in behavior (Mezirow, 1991).

The testimonials of the students from the MBA in Ecosystem of Innovation reveal experiences of transformative learning that cover various dimensions, indicating changes in both the professional realm and individual perception and collaborative practices. By employing a more in-depth analysis in light of Jack Mezirow's transformative learning theory (Mezirow, 1991, Mezirow, 2009), significant connections can be identified.

The professional advancement of an interviewee suggests an identity and professional transformation. Mezirow (2009) highlights that transformative learning often implies a fundamental reassessment of identity, aligning clearly with the mentioned professional development.

The shift in perspective regarding trust and the adoption of collaborative practices (I13) and the deconstruction of the competitive mentality in favor of collaborative construction (I18) can be related to Mezirow's theory of changes in meaning structures. This transformation in the approach to relationships and results demonstrates a profound change in mental structures, which is crucial in transformative learning.

The restlessness sparked by the course (I19) highlights the critical and social awareness, a crucial dimension in Mezirow's theory. The perception of distance regarding innovation and the drive to contribute more actively to the ecosystem demonstrate a genuine commitment to social transformation and the practical application of learning. When an individual faces a disorienting dilemma, they need to process this experience and reflect on their beliefs and values. This process of critical reflection can lead to a change in perspective, that is, a new way of seeing the world and oneself (Mezirow, 1991).

A person undergoing a perspective transformation may experience disorientation, engage in self-examination, critically assess current assumptions, realize that those assumptions may no longer serve them best, explore new options, try on new ideas or roles, and integrate the new perspective into their lives (Mezirow, 1997). This suggests that individuals often think and act based on assumptions they have consciously or unconsciously absorbed from their context or culture. However, through appropriate educational interventions, transformative learning can initiate a process where individuals first reconsider old things in new ways, then progress through examining new things from new perspectives, and ultimately engage in doing new things in new ways. So, educational interventions can stimulate individuals to

critically reflect on their existing beliefs, consider alternative perspectives, and ultimately enact changes in their behaviors and actions (Mezirow, 2009).

When analyzing these reports from the perspective of Mezirow's theory, it becomes clear that the MBA in Innovation Ecosystem not only transmits knowledge, but, more deeply, promotes transformative learning that transcends the professional aspect, achieving identity, social and cultural transformations in the participants.

Obviously, during the interview with the actors involved in the course, some aspects were commented that were not very good for the learning or progress of the course, such as, for example, the teaching of some very traditional teachers, the fact that it is much more theoretical than imagined and mainly what was highlighted by everyone was the fact that classes were completed online due to the covid pandemic

> We could have delved much deeper into the pact (Pacto Alegre), analyzed it, put our hands on, actively contributed to its initiatives, and engaged in activities both within and associated with the pact, enhancing its impact. (I14)

> I believe it's essential to bring people into the heart of the matter, examining the Rio Grande do Sul (RS) ecosystem comprehensively. There's a wealth of activities beyond Porto Alegre that deserves exploration. Additionally, there's a unique perspective I'd like to explore further. Do you follow? I want to understand what brings me here to Alegrete. The mayor might not fully grasp it yet, given the absence of companies and the federal nature of the university, but I want to witness it firsthand (I15).

> Certain faculty members were more theoretical in their approach, lacking practical experience and insight into the day-to-day dynamics of an innovation environment, startups, and innovation programs. This imbalance between theory and practical knowledge was notable (I20).

All interviewees, both students and teachers, emphasize the shift of classes to the online format. For a significant number of students, this had a negative impact on learning and interactions, highlighted by everyone as the major issue of the course, considering it was originally designed as a face-to-face program with on-site activities and immersions. Similarly, for some teachers, the shift to the online format somewhat affected their teaching methods and interactions. However, they do not see it as an obstacle to the program's development. I1 says "It is very different when people already know each other in person, and then it goes virtual; this facilitates because the students already know each other." and according to I10: "Oh, but I didn't feel such difficulty, a loss for it being virtual in our activity, but we developed it in the same way under the conditions we had."

On the other hand, It is worth noting that the online format of the program, which was switched to this modality due to the 2019 pandemic caused by Covid, brought several negative aspects, mainly engagement with activities and learning.

> In in-person classes, we were able to have some sessions that were a bit more practical and dynamic. There were some teachers who followed a more traditional teaching approach, using PowerPoint, speaking, opening for questions – nothing very dynamic. There were few teachers who provided that. And when it moved to online classes, it got worse (I.13)
>
> I prefer when classes are more group-oriented, with group interaction. And when it shifted to online, I faced more difficulties (I14).
>
> In the online format, the classes turned more into debates on the subject than a unilateral presentation. However, this dynamic is lost online because if I'm speaking in a class of thirty, if I'm talking, someone else's audio might get muted, and sometimes we can't understand what the other person is saying. Also, we ended up having classes only at night, and we lost that aspect of spending the whole day on weekends going out for lunch, discussing class matters, and coming back. The quality of the debate was compromised (I17).

From the interviews, an educational approach has emerged that prioritizes dialogue, collaboration, and collective knowledge construction. The mentioned dynamics, along with classroom debates, case studies, and practical activities, underscore the emphasis placed on active student participation. This approach creates an environment conducive to idea development, encouraging the exchange of perspectives and the co-creation of knowledge. As Vygotsky (1978) emphasizes the importance of collaborative learning environments in promoting deeper understanding and knowledge construction.

These elements point towards the adoption of pedagogical methods that go beyond the mere transmission of concepts. The promotion of interactive and practical dynamics highlights the importance of the professor not only as a traditional knowledge transmitter but as a facilitator of the learning process.

> A rather peculiar aspect of this MBA was the active participation of students in the classroom; they not only engaged intensely, but this dynamic also reflected the professor's skill, at least in my perspective, in knowing when to pass the stage to the students (I7)
>
> The course activated leadership, there were such capable people there that what we did was share mindsets and activate some individuals to become leaders in other initiatives, right? There is, in fact, a propagation function, but remember the quality of the students we have. Of course, we have a training

> process, but it's not exactly the traditional learning process, right? It involves much more sharing and activating these individuals within a certain logic that the MBA brings.For me, as a professor, one issue was the quality of the students and how we built upon their shared experiences. So, I would enter the class with a perspective, but the exchange itself led me to refine not just the technical content, but also the relationships I had with our ecosystem (I.5)

Participant I.5's reflection on the activation of leadership within the MBA program highlights the transformative potential of higher education in fostering students' professional development and societal engagement. This aligns with discussions on the role of universities as drivers of social change and innovation (Clark, 1998; Etzkowitz et al., 2000). Additionally, authors such as Tinto (1997) have explored the concept of student persistence and engagement in higher education, emphasizing the importance of supportive learning environments and meaningful interactions with peers and faculty.

I10 highlights the importance of qualitative aspects like group harmony for effective learning, emphasizing the role of collaboration and teamwork. Additionally, they advocate for a horizontal learning process where knowledge is co-constructed through dialogue and interaction, rather than being delivered through lectures. This approach fosters active participation and exploration of diverse perspectives, although it may not meet the expectations of all students. Overall, the instructor's pedagogical philosophy prioritizes creating an engaging and collaborative learning environment centered on dialogue and interaction for the co-construction of knowledge.

> "When it clicks, when you see that a good harmony has been established, this group is very good, we will work together and everything. So, this is a first characteristic, it's a qualitative thing that you can't really measure.
> The second point is that, well, it depends a lot on what each professor believes in pedagogy classes, right? I believe in a horizontal learning process. We never enter a class presenting a concept. Right? We come into classes listening, and based on what people bring, we elaborate on concepts, right? So, it's not a delivery, which might even frustrate some students expecting someone to deliver something; it's a dialogue that tries to build from what we receive. The methodology is that, and I have very little certainty in life, you know? I've been working for about ten years trying to use this logic of conversations." (I10)

This MBA experience showcased a distinctive emphasis on student engagement, portraying a dynamic where students actively participated, reflecting the professor's adeptness in handing over the reins judiciously. This interaction

underscores a pedagogical philosophy rooted in collaborative learning and shared responsibilities, where dialogue plays a pivotal role. The dialogue reinforces the transformative role of dialogue in shaping the learning experience.

From the interviews, a significant number of respondents highlighted the importance of connections and networking fostered by the course. The diversity of participants, stemming from the four helices (Carayannis & Campbell, 2009), not only enriched the educational environment but also sparked stimulating debates and valuable connections. The variety of perspectives not only facilitated networking but also propelled the formation of tangible partnerships.

These interactions extended beyond theoretical discussions; they evolved into practical challenges, leading to concrete collaborations. The relationships established during the course surpassed the academic setting, transforming into collaborative projects centered around the innovation ecosystem.

In addition to broadening horizons, diversity challenged paradigms and culminated in tangible actions in the innovative landscape. This collaborative approach underscored the crucial role of heterogeneity in promoting transformative learning and driving practical initiatives in innovation ecosystems.

This specific evidence leads to the fourth proposition:

Proposition 4: The presence of diverse participants enhances the depth and richness of transformative learning experiences, shaping academic proficiency and career paths through networking opportunities.

Habermas believed that discourse could lead to a consensus and thereby establish a belief's validity (Mezirow, 2009). While no one truth exists, the more interpretations or points of view we have to dialectically sift through, the greater the likelihood we will discover a better or more dependable interpretation that can be maintained as a worldview or frame of reference - until we encounter yet new evidence, arguments or perspectives . This dialogue with others is the "safety net for an individual's newfound or revised assumptions", because they are reassured of their objectivity, and it becomes the medium to be able to put critical reflection into action (Taylor, 1998). The meaning of a transformative concept becomes significant to a learner through mutual, voluntary discourse with others.

After all the evidence was gathered and analyzed, it became evident that a significant transformative learning also occurred within the university's sphere, the university underwent through a transformative learning experience through initiatives such as the Aliança para Inovação, Pacto Alegre, and the implementation of the MBA in Innovation Ecosystems. During interviews and secondary data analysis, the perception emerged that the respondents, especially the professors and those directly involved with the university, witnessed a profound shift in collaborative mindset. This transformation manifested as a greater willingness to collaborate in the development of projects and partnerships. This transformation manifested as a greater willingness to collaborate in the development of projects and partnerships (Smith & Johnson, 2015).

The insights gleaned from interviews and data analysis reveal a profound shift in the collaborative mindset among university stakeholders, particularly professors and those closely affiliated with academic institutions. Notably, there is a marked increase in their willingness to engage in collaborative endeavors, both in terms of projects and partnerships.

Moreover, these findings underscore a transformative shift in the perception of universities. Rather than viewing each other as competitors in a competitive landscape, there's a growing recognition of universities as integral components of a collaborative network. This renewed perspective emphasizes the synergistic collaboration among universities within an interconnected ecosystem.

This shift in perspective not only highlights the fundamental role of universities as active contributors to the innovation ecosystem but also signifies a broader engagement in driving transformative processes and fostering innovative development. In this evolving paradigm, higher education institutions are positioned as key drivers of change, actively shaping the future through their engaged participation in interdisciplinary collaboration and community engagement initiatives.

In parallel, the book "Designing the New American University" by Crow and Dabars (2015) echoes these themes, advocating for a model of higher education that prioritizes innovation, accessibility, and societal impact. By fostering interdisciplinary collaboration, research-driven education, and community engagement, this model seeks to enhance the relevance and effectiveness of universities in addressing contemporary challenges and driving economic and social development.

It is crucial to emphasize that the distinctive features of the studied case, particularly the MBA in Innovation Ecosystem, with its innovative curriculum, renowned faculty, and collaboration among the three main educational institutions in Porto Alegre, provided a unique context. The inclusion of practical activities and collaborative classes involving both professors and representatives from the 4 helices of the ecosystem elevated this case, clearly illustrating transformative learning for all those directly involved in the course. Consequently, it made numerous contributions to the innovation ecosystem.

In general, the participants of the course acknowledge transformative learning as a fundamental pillar of the MBA in Innovation Ecosystems (EI). They mention experiences of mindset shift, adaptation, critical reflection, and practical application of acquired knowledge. The contribution to the ecosystem is primarily evidenced through the development of applied projects, such as in the case of the final thesis (TCC), ongoing partnerships established during the course that continue to the present moment

Chart 12: Northworthy remarks: transformative learning

Considerations	Remarks	References
1. Transformative Learning as a Shift in Perspective	Transformative learning is conceptualized as a process that leads to a fundamental reassessment of identity, aligning with professional development and a shift in worldview.	Mezirow's transformative learning theory (1991) serves as the foundational framework for understanding the profound shifts in thinking, feeling, and acting experienced by participants. Interactions with colleagues from different backgrounds and areas of expertise were essential in expanding my worldview and deepening my academic understanding of the innovation ecosystem. This diversity enriched discussions in the classroom, especially when we were in person, and expanded my networking (I12) , Not only were the teachers incredible, but the class was incredible too, so there was a lot of exchange, a lot of discussion and there were several moments like, okay, now I understand what I have to do, now it made sense because there were a lot of things I didn't do The activities and examples made sense (I17)

		I think that the final work (TCC) as it was totally applicable and practical was something that was very impactful for me and I think also for those who saw it, as I created a YouTube channel that interviews many people, teachers, responsible for innovation in RS and I managed to share the information I was learning with many people (I18)
2. Collaborative Mindset in Higher Education	The university's role in the innovation ecosystem involves a shift from a competitive to a collaborative mindset, where universities actively contribute and collaborate synergistically within an interconnected network.	Russell et al. (2015) associate the emergence and evolution of innovation ecosystems with the proliferation of collaborative networks aiming to produce innovation interactively, through a collective action of legally independent actors So cooperation is totally in order, right? In addition to cooperating to set up the program, it was a program, a course designed by many people, right? From what it should contain, what the logic will be, how we will organize the structure, what comes before, what comes after, what time it is, When will this come in? Then, there was all this pre-structuring articulation of a grid and there is a whole articulation that goes on and on and then comes this result of interactions, right? That continues to happen between teachers and institutions to this day (I7)
3.Collaborative Learning Enhances Transformative Learning	Collaborative learning, as evidenced by the collaborative design of the MBA program and active student participation, contributes to the depth and breadth of transformative learning experiences.	Participating in the MBA, alongside highly qualified individuals from diverse backgrounds, not only expanded my understanding of innovation ecosystem topics but also challenged my own perspectives. My career, which until then had been in another institution, was certainly impacted by the course, which provided me with more than just knowledge." (I12) collaborative learning methodologies can enhance critical thinking skills in students. Through active engagement in discussions, problem-solving tasks, and

		interactions with peers, collaborative learning encourages students to explore diverse perspectives, analyze information critically, and constructively evaluate ideas. By working together in groups, students learn to articulate their thoughts, defend their viewpoints, and consider alternative viewpoints, thus fostering a deeper understanding of complex concepts and enhancing their ability to think critically (Johnson & Johnson, 2009)
4.Practical Application Reinforces Transformative Learning	Practical experiences, such as applied projects, immersions, and engagement with the innovation ecosystem, reinforce transformative learning by providing real-world contexts for the application of acquired knowledge.	Kolb (1984) explains that experiential learning is a holistic approach that combines action, reflection, theory, and practice. It acknowledges that learning is a personal and interactive process and adapts to the evolving educational landscape, making it a vital methodology in contemporary education. I think students "could be more utilized" during their postgraduate studies, participating more actively in the ecosystem, providing consultancy, and offering ideas. We were very qualified students, wonderful projects and ideas could have emerged for the Innovation Ecosystem, projects. I think there should be more hands-on. That would be something more practical and more transformative and challenging. (I16)
5. Career Impact as a Tangible Indicator	Consider the impact on the career as a tangible indicator of transformative learning. This suggests that the transformation extends beyond academic mastery, influencing the professional trajectories of participants.	During the interviews, some students participating in the course highlighted the influence of the MBA program on their professional trajectories. Specifically, four individuals underscored how their involvement in the program led to advancements within their current positions or facilitated transitions to roles more closely aligned with the domain of innovation. One interviewee articulated a particularly noteworthy point, emphasizing how the collaborative nature of the program and the concepts explored therein directly translated to tangible benefits in her career. She attested to actively experiencing the principles of

		collaboration cultivated during the MBA, underscoring how these experiences significantly shaped her career trajectory. But the course definitely changed the way I see things and completely transformed my work, and that's an interesting thing because I insisted on it, my colleagues here at the regional office didn't take it seriously, didn't believe it. Through the MBA course, I began to understand that it's through the ecosystem, and today, it took a while for things to start moving, but about a year and a half ago, projects started to appear, right? And people come to me and ask, 'How do you get these clients out of nowhere?' I look and say, 'It's not out of nowhere, they come to me because I started to establish links with ICTs, with governments, a lot of contacts!' This had a tremendous result." (I14)

Source: Research data

In summary, the MBA program in Innovation Ecosystems fosters transformative learning rooted in Mezirow's theory. It sparks a profound shift in participants' perspectives, aligning with professional development. The university's collaborative mindset and the emphasis on collaborative learning amplify transformative experiences.

Practical application through projects and engagement in the innovation ecosystem reinforces theoretical insights. The program leverages dialogue, collaboration, and diverse participant backgrounds, generating disorienting dilemmas that challenge assumptions.

Networking is a crucial catalyst, fostering knowledge exchange and opening doors for future opportunities. Transformative learning extends beyond individual growth, catalyzing collective actions within innovation ecosystems. Career impact serves as a tangible indicator, showcasing the program's influence on participants' professional trajectories. In essence, the MBA program intertwines various elements to deliver a holistic and impactful transformative learning experience.

Therefore, the present study has, through its evidence, reinforced the fields of Innovation Ecosystem's theories. But more than so, it has brought up some new evidence that helped to deepen the theories and broaden the knowledge on the subject. Therefore, propositions were presented, and they are correlated with theories as in chart 13.

Chart 13 - Propositions from Evidence and Theories

proposition	Pieces of evidence	Literature
Proposition 1: **Building robust and diverse partnerships is fundamental for nurturing a thriving innovation ecosystem and can be seen as an opportunity for transformative learning.**	The focus here is on the partnership with different stakeholders, mainly from 3 renowned educational institution, government and society "We constitute a cooperative group, working and creating together, conducting joint research, underscores our collective impact". (I2). "We have had the most respected professors from 3 different universities and they were inserted in the innovation Ecosystem of Porto Alegre… There was a good interaction between all the triple helix that's why it succeed" (I8) the partnership among the 3 universities was fantastic, because from this we could develop many projects together, one more specifically with many students involved and universities from Colombia and South Africa and we've had great results" (I4) The course activated leadership, there were such capable people there that what we did was share mindsets and activate some individuals to become leaders in other initiatives(I5)	Innovation ecosystems are considered as a unique and specific type of networks, encompassing a diverse community of actors with multilateral and multisectoral ties, spanning the boundaries of a single industry and emphasizing increased interdependence as well as symbiotic potential among the actors. (Autio & Thomas, 2014). The process of collaboration between multiple actors in innovation ecosystems is an iterative process which support the diffusion of innovation that has important implications for building sustainable innovation ecosystems (Sultana & Turkina, 2023) Once Transformative learning helps to articulate, anticipate, and facilitate the needed changes in different societies/communities/ecosystems. In this sense TL as a *process* combines critical reflection and dialectical discourse situated in historical and socio-political contexts, but also action in the service of societal transformation (Formenti & Hoggan-Kloubert, 2023)

Proposition 2: **Collaboration and alliances are fundamental strategies for universities to effectively fulfill its role in the Innovation Ecosystem.**	Here is where the university plays a central role as a promoter of collaborations at different levels and among various actors. The role of the university in this creation was indeed one of the objectives, right? To make this contribution to the innovation ecosystem because it was focused on the innovation ecosystem of Porto Alegre (I2). The partnership between the three universities, which are pioneers, managed to create something of great impact for the innovation ecosystem of Porto Alegre (I3). The case of the three universities is an international reference because it was through them that many projects that are still being developed in the territory were initiated (I6). The first mission is teaching, then research, and extension; the third is generating impact on society or the environments in which they live; the fourth is acting collaboratively, and the three universities exemplify this (I7). They formed almost forty leaders in the theme of regional ecosystem leadership and innovation who could then leave there, implement ideas, and advance in their regions. So, I think this was an important point, right? And also spreading a little more of this culture of innovation (I4).	Whether diversity means organizations in different industries or people from different socioeconomic backgrounds, genders, ages or education levels, everyone in your ecosystem is playing for the same team. The best ideas rarely arise when everyone has the same point of view or experience. The study explored the business case for diversity and found a strong correlation between innovation and diverse workplaces (Goryachev, 2018) Innovation is a team sport. Gone are days of proprietary thinking and solo-entrepreneurship. Innovation is better together -- co-innovating with an ecosystem of diverse partners. But, without clear, consistent and candid communication that includes listening and learning, you'll end up spinning your wheels (Goryachev, 2018)
	"The students were stars; we just gave them voice and stage. In my discipline, it was a dialogue on equal terms" (I6).	The key functions of the university of conducting research and educating future academics and professionals, leaders and innovators, are increasingly enacted in densely

Proposition 3: universities must enhance students' role in the ecosystem in order to offer them the spotlight they deserve as active and relevant actors.	"Some space for experimentation is necessary for this; otherwise, it will never work" (I2). "It's pedagogical because I need to convince people that there are other ways of teaching than what they are used to. It's much more practical to just give my lecture, right? Without bothering to change the pedagogy and teaching method to a more participatory one and putting the student as the agent is very difficult for many professors" (I2). "There were professors who just came, taught, and left, using slides in a very traditional way, but there were several who did very practical activities, creating things" (I15). "The thesis was wonderful because we had to create something that impacted the innovation ecosystem, but only in the thesis. In most disciplines, not from this transformation can I impact the environment" (I17). "There were very cool projects, you know? I understand that through an applied project is how we could deliver something to the ecosystem, and that was it, perhaps the only viable way to do this was by sending the individual to the ecosystem and realizing the difficulties of it, that not everything is as they think it is or as they live	networked processes of knowledge creation. The case studies provide rich evidence of the ways in which the new formats of producing and sharing knowledge, and of orchestrating multi-actor knowledge creation processes, are integrated with traditional roles of educating students and developing research. This is the result of profound, systematic institutional transformations The competences that the universities are developing in their students match the needs of current and future challenges. This means answering the question of what conditions are needed for individuals to realize their full potential and to contribute to society, particularly in a context of change. The importance of interdisciplinary approaches to defining and solving knowledge problems. They insisted on the necessity of integrating interdisciplinary approaches into teaching curricula and methods Universities strongly emphasized the importance of preparing students to address disruptive social, technological and economic challenges in the future. The student-focused, challenge-based way of learning includes opportunities for students to learn across the boundaries of disciplines, programmes and schools, while optimizing the connection to real-life cases and projects in multi-disciplinary teams in close collaboration with surrounding society (reichert, 2019)
	It emphasizes how diversity among participants enriches	Facilitating and conducting interdisciplinary research was the most important incubating role of the university in innovation systems.

Proposition 4: The presence of diverse participants enhances the depth and richness of transformative learning experiences, playing a pivotal role in shaping academic proficiency and career trajectories through the breadth of networking opportunities available.	learning experiences. By bringing together individuals from varied backgrounds, cultures, and perspectives, it enhances the depth of understanding and fosters critical thinking. This diversity also provides ample networking opportunities, which play a crucial role in shaping academic proficiency and influencing career paths. Overall, diverse participation contributes to a more dynamic and inclusive learning environment, preparing students for success in both their academic and professional endeavors In the classroom, discussions were incredibly rich because each person came from a different area, some with extensive knowledge in the field and others with very little, which brought about diverse backgrounds, discussions, and multiple perspectives on the subject matter" (I18) "The students were stars; we just gave them voice and stage. In my discipline, it was a dialogue on equal terms" (I6). "Some space for experimentation is necessary for this; otherwise, it will never work" (I2). "It's pedagogical because I need to convince people that there are other ways of teaching than what they are used to. It's much more practical to just give my lecture, right? Without bothering to change the pedagogy and teaching method to a more participatory one and putting the student as the agent is very difficult for many professors" (I2). "There were professors who just came, taught, and left, using slides in a very traditional	Accordingly, cross-disciplinary networks are the key organizational preoccupation of any research-intensive innovative university. (Reichert, 2019) The development and implementation of innovations in higher education systems have broad impacts on various system elements: components, relationships, and functions. At the component level, a diverse array of individual and institutional actors are influenced by these innovations. Regarding relationships, cooperation, networking, and increased mobility alter traditional dynamics among actors or introduce new ones. Education experiences the most significant impact at the functional level, with research and engagement functions also showing growing influence. This suggests an evolving stage for many innovative practices rather than a lack of importance. Over time, innovations are likely to intensify their impact on other system functions as they mature and diffuse more widely Innovative practices changed not only relationships between individuals and between institutions, but also between individuals and institutions. This was visible in some forms of conflict between the new and old forms of teaching, learning, university-faculty relationships, university-external technology providers, intellectual property rights, etc. Brennan (2014) TL recognizes the world's complexity and dynamic interconnectedness; TL brings positive outcomes for the individual, group, organization and “not only for the planet's sake” Boström et al., 2018)

	way, but there were several who did very practical activities, creating things" (I15). "The thesis was wonderful because we had to create something that impacted the innovation ecosystem, but only in the thesis. In most disciplines, not from this transformation can I impact the environment" (I17). "There were very cool projects, you know? I understand that through an applied project is how we could deliver something to the ecosystem, and that was it, perhaps the only viable way to do this was by sending the individual to the ecosystem and realizing the difficulties of it, that not everything is as they think it is or as they live	

Source: elaborated by the author

As Chart 13 shows, theories from authors are supported by the evidence gathered in this research. Nevertheless, some ideas were better explored in this study and new evidence is further discussed in the propositions that escalates the knowledge, bringing new and fresh ideas of important roles and features in the Innovation Ecosystem.

Innovation ecosystems thrive on robust partnerships that bring together diverse stakeholders such as educational institutions, government bodies, and societal actors. These partnerships are crucial for nurturing a dynamic environment where transformative learning can flourish. As highlighted in Proposition 1, collaboration among stakeholders creates opportunities for collective impact and drives innovation forward. Examples illustrate how partnerships between renowned educational institutions, government entities, and society have led to successful projects and initiatives, underscoring the interconnectedness and symbiotic potential within these ecosystems.

Within innovation ecosystems, universities play a central role as hubs of knowledge creation, dissemination, and application, as emphasized in Proposition 2. Through collaboration and alliances, universities effectively fulfill this role, promoting

interdisciplinary approaches and fostering partnerships at various levels. Case studies demonstrate how universities contribute to the innovation ecosystem by preparing students to address future challenges, engaging in research initiatives, and creating real-world impact. The importance of diversity within these collaborations is highlighted, reflecting the evolving nature of education and its role in societal transformation.

Proposition 3 emphasizes the need for universities to enhance students' involvement in innovation ecosystems, providing them with opportunities for experiential learning and interdisciplinary collaboration. By placing students at the forefront of innovation initiatives, universities empower them to become active contributors to societal change. Examples illustrate how student-led projects and experiential learning opportunities contribute to the development of critical skills and foster a culture of innovation within academic settings.

Diverse participation is essential for enriching transformative learning experiences, as outlined in Proposition 4. By bringing together individuals from varied backgrounds, cultures, and perspectives, innovation ecosystems foster inclusive environments where critical thinking thrives. Interdisciplinary research and innovative teaching practices further enhance learning outcomes, preparing students for success in both academic and professional settings. The fluid integration of diverse perspectives and collaborative approaches strengthens the depth and richness of learning experiences, ultimately driving positive outcomes for individuals, organizations, and society as a whole.

In summary, the propositions collectively advocate for inclusive, collaborative, and student-centered approaches to fostering innovation ecosystems and transformative learning. By prioritizing partnerships, diversity, and active engagement, stakeholders can create vibrant environments where innovation flourishes, driving positive change and shaping the future of education and society.

6. FRAMEWORK FOR UNIVERSITY CONTRIBUTION THROUGH TRANSFORMATIVE LEARNING TO THE INNOVATION ECOSYSTEM

After the analysis of both primary and secondary data in this research, we have developed a theoretical-practical framework that outlines how the university, through its various roles, has the ability to catalyze transformative learning among diverse stakeholders, while simultaneously making significant contributions to the innovation ecosystem. This framework aims to provide a comprehensive understanding of how higher education institutions play a crucial role in instigating learning processes that transcend mere knowledge acquisition, seeking to fundamentally transform the perspectives and actions of those involved in the innovation ecosystem.

The concept of an innovative university, as described by Van Vught (1999), represents a departure from the traditional model of higher education. An innovative university embodies a progressive approach to education, transcending the role of traditional academic institutions. While it continues to educate traditional academic intellectuals, its mission extends beyond imparting conventional knowledge. Instead, it serves as a dynamic platform for equipping students with new skills and competencies that are essential for success in an ever-evolving world (Van Vught, 1999).

Crucially, an innovative university recognizes that research outputs are no longer confined to academic silos ((Reichert, 2019). Rather, they are seen as integral components of a broader ecosystem of knowledge dissemination and exchange. Through collaboration and engagement with external partners, such as industry stakeholders, governmental agencies, and community organizations, innovative universities leverage established mechanisms like science parks, technology transfer offices, and incubator programs to facilitate the transfer of knowledge and expertise.

In essence, an innovative university embraces a holistic approach to education and research, fostering a culture of collaboration, creativity, and entrepreneurship. By actively engaging with external networks and leveraging emerging opportunities, it not only advances academic excellence but also drives societal impact and economic development. Through its multifaceted initiatives and partnerships, an innovative

university serves as a catalyst for innovation and positive change in the broader community.

Hall (2020) explains that an innovative university is more than inventorship, techno-transfer, and commercialization; it is a synergy of different endeavors tailored for continuous development. The statement highlights that an innovative university goes beyond traditional functions like inventorship, techno-transfer, and commercialization. It embodies a synergy of diverse endeavors tailored for continuous development. This includes fostering creativity, collaboration, and entrepreneurship, engaging with external partners, and maintaining a commitment to ongoing improvement and evolution. In essence, an innovative university serves as a dynamic hub of innovation and positive change, making meaningful contributions to society.

Tassone et al., (2018) suggest interdisciplinarity, hands-on experience, and relational pedagogies as means to provoke expected and unexpected dilemmas. Rodríguez Aboytes and Barth (2020) discuss relevant features of the learning process, outcomes, and conditions for TL. In the learning process, they show the relevance of discourse, as a process of sharing knowledge and practices, entailing conflict and problem resolution; even when it comes to action engagement there is a need for relational and social conditions beyond the individual, for example, the implementation of participatory decision-making and critical awareness in the community body. Learning outcomes are manifold: the shared construction of new knowledge, practical skills and understanding; a sense of unity and interconnectedness; changes in worldview and identity; a sense of agency and empowerment; critical systemic and complex thinking; and social learning—defined by the authors as the reinforcement of social relationships within and among groups and organizations, political action, mobilization, and activism.

Gordon (2020) argues that disrupting pedagogies by which students and staff learn to deal with complexity and uncertainty, bringing multiple voices and actors into the scene, building science more congruently with real life, and challenging visible and internalized powers. Here again, cognitive and collective transformations need to be linked, and theoretical pluralism can be a solution to some limits of TL.

Transformative Learning can be seen and used as a compelling theoretical and practical tool to contribute to a new epistemic and social turn through challenging dominant structures and knowledge networks. This includes implementing

transdisciplinary and trans-cultural dialogue, shared decision-making processes and good enough relational spaces. Not everything is on the shoulders of individuals, or in their power. the growing interest for TL in literature at a global scale can be seen as the answer to an urgent search for conceptual and practical tools of societal transformation (Formenti & Hoggan-Kloubert, 2023)

Cultivating diversity through a diverse student population and diverse learning opportunities (methods, curriculum, etc.) is essential to transformative learning experiences yet difficult to achieve fully. Higher education institutions continually struggle to take the value of diversity from talk and token cultural events to embedded change (Keating, 2007).

The diversity must permeate what takes place in the classroom. Such a classroom must “examine one’s assumptions” and create space “to engage in challenging dialogue” (Nielsen, 2016)

In this study, it sheds light to the MBA in Innovation Ecosystem, created by the Alliance for Innovation in Porto Alegre, fosters transformative learning experiences that transcend traditional methods. These experiences immerse students in real-world projects and interactions with industry experts, challenging them to think critically and develop innovative solutions.

Through collaboration with various stakeholders, including academic institutions, government bodies, and businesses, the Alliance for Innovation aims to drive innovation and economic growth in Porto Alegre. Education plays a pivotal role in catalyzing this innovation, equipping individuals with the skills and mindset needed to identify opportunities and create value.

Universities, through programs like the MBA in Innovation Ecosystem, serve as catalysts for innovation by nurturing talent and facilitating collaboration. By bringing together diverse perspectives and resources, universities shape dynamic innovation ecosystems that promote the exchange of ideas and best practices.

Collaboration, a cornerstone of innovation, is fostered within university settings, where students, faculty, researchers, entrepreneurs, and industry partners work together on innovative projects. These collaborations drive tangible outcomes for societal and economic development, including the development of new products and services, job creation, and improvements in quality of life.

In conclusion, innovative MBA programs like the one offered by the Alliance for Innovation in Porto Alegre play a vital role in fostering transformative learning

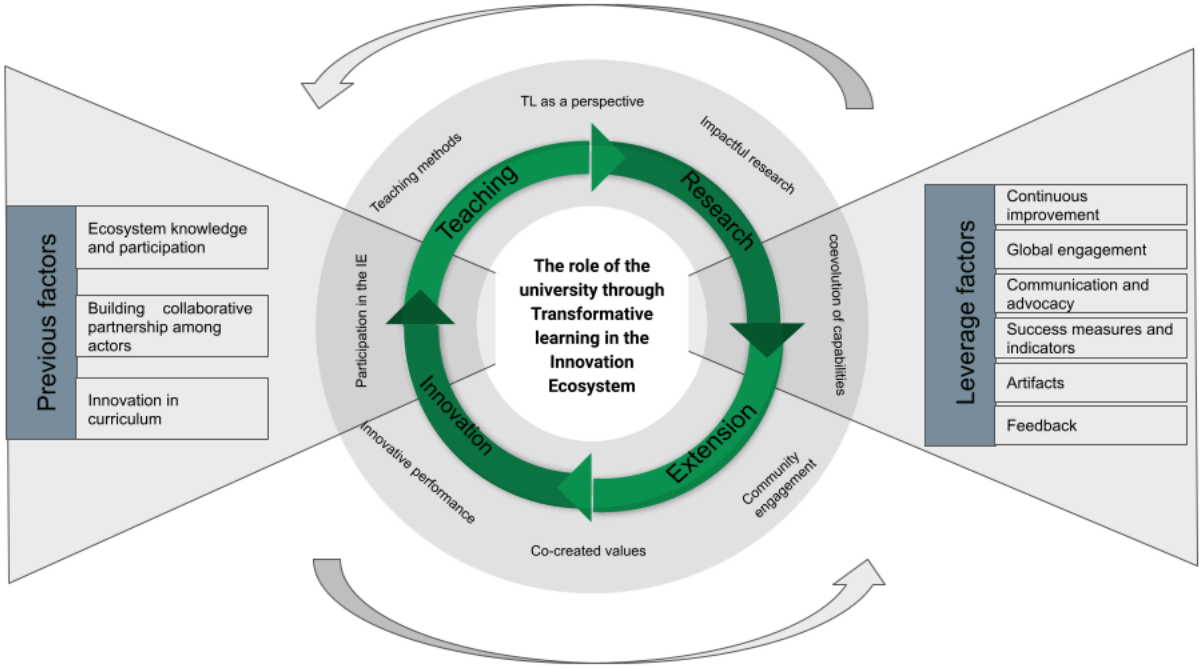
experiences that catalyze innovation, shape dynamic ecosystems, promote collaboration, and drive tangible outcomes for societal and economic development.

Drawing from collected interviews and a thorough literature review, this study proposes a framework illustrating the university's potential role in fostering transformative learning within the innovation ecosystem. Rather than a passive institution, the university emerges as a dynamic center catalyzing transformative learning that permeates the broader innovation landscape. This journey is mapped through 14 interconnected pathways outlining how the university can contribute to the innovation ecosystem through transformative learning.

Following the research process, the study will present its findings alongside ensuing discussions. The overarching objective was to develop a conceptual framework that effectively organizes and synthesizes these research outcomes, facilitating a deeper understanding of the subject matter. This framework (Figure 6) should be designed to provide practical and strategic guidance to the university in promoting transformative learning and boosting the innovation ecosystem.

So, we believe by strategically leveraging these categories within the university context, transformative learning can be harnessed as a powerful catalyst for driving innovation, fostering a culture of creativity and adaptability, and nurturing the next generation of innovators and change-makers.

Figure 6 - Framework



Souce: created by the author

The presented framework offers a comprehensive guide for universities aspiring to play a pivotal role in innovation ecosystems through transformative learning. Its applicability is evident in its structured approach, addressing key aspects from understanding the ecosystem to measuring success.

Importantly, the framework underscores the significance of collaborative alliances, curriculum innovation, and a transformative learning approach. It emphasizes faculty development to foster critical reflection and experiential learning, contributing to a holistic educational experience.

It is worth noting that certain previous factors should be taken into account when considering universities' role in innovation ecosystems. These factors include acquiring a deep understanding of the ecosystem, actively engaging with stakeholders, fostering collaborative partnerships, and incorporating innovative approaches into the curriculum.

Universities play a pivotal role in innovation ecosystems by cultivating a deep understanding of the local and global innovation landscape (Etzkowitz, 2008). Active participation in ecosystems involves engagement with industry, government, and other stakeholders to gather insights into challenges and opportunities. By understanding ecosystem dynamics, universities can tailor their educational

programs and research initiatives to address specific needs (Breslin & Buchanan, 2020). So, the university is a key institution that generates crucial knowledge alongside other agents, institutions, activities, and cultures that either support or hinder local innovation. Universities, through their teaching, research, and third role, serve as catalysts for innovation, facilitating collaboration, knowledge exchange, and transformative change within the ecosystem (Heaton, Siegel, and Teece, 2019).

In this sense, the university, when participating actively in the IE, can provide opportunities for collaboration, networking, and knowledge sharing. This can help businesses stay informed about the latest trends and developments in their industry, and identify new opportunities for growth and innovation (Salageanu Soldan & Bejinaru, 2023).

Collaboration is essential for driving innovation, and universities serve as catalysts for fostering collaboration among various actors (Huxham & Vangen, 2005). Through collaborative partnerships, universities create platforms for knowledge exchange and co-creation (Chesbrough, 2003). These partnerships can take various forms, including joint research projects and industry-sponsored initiatives Rothaermel, Agung, & Jiang, 2007). Moreover, effective cooperation and communication between institutional leaders and faculty members are essential for building and sustaining collaborative alliances (Lunag Jr et al., 2023). This aspect underscores the importance of leadership engagement in fostering a culture of collaboration and innovation within the university.

Lv et al (2022) explains that higher education institutions should, then contribute to the integration between industry and education and should promote education for innovation and entrepreneurship as a starting point for the reform and reconstruction of the talent training paradigm. Additionally, higher education institutions should set up educational programs around the various links of the industrial chains, encourage their economic partners to participate in education for innovation and entrepreneurship and promote the tight interconnection between the educational chain, the talent chain, the industrial chain and the innovation chain. They should also comprehensively improve the quality of education and promote economic transformations (Lv et al., 2022).

Transformative learning occurs through innovative curriculum design that integrates principles of innovation and entrepreneurship (Christensen & Eyring, 2011). Infusing innovation into the curriculum prepares students to become adaptive

problem-solvers and effective collaborators (Nesta, 2020). Moreover, experiential learning plays a crucial role in fostering innovation in the university curriculum. According to Kolb (2014), experiential learning approaches, such as internships, project-based learning, and simulations, provide students with opportunities to apply theoretical knowledge in practical settings, enhancing their problem-solving skills and innovation capabilities. By engaging in hands-on experiences, students develop a deeper understanding of complex concepts and gain valuable insights into industry practices.

Lv et al (2022) argue that universities should make and Integration between specialization standards and professional requirements, Integration between educational resources and industrial resources, integration between educational culture and enterprise culture, Integration between the educational system and industrial research and development mechanisms.

Universities must strive to increase students' real-world productive experience and enhance their mastery of professional knowledge and industrial technology, cultivate their sense of innovation, inspire their innovative thinking, and promote their creativity (Penaluna, 2014). This is an effective way to alleviate the inherent contradictions between the educational system and the industrial system and promote the full integration of basic elements on the supply side of talent training and on the demand side of the industry.

Universities are also important because by encouraging entrepreneurship among students and the university community, universities can help create an entrepreneurial culture in their region and stimulate local economic development by nurturing a culture of innovation, it inspires creativity and encourages the development of new ideas and solutions (Salageanu Soldan & Bejinaru, 2023).

It is essential that the university works actively to develop its programs through teaching, research, extension, and innovation, carefully considering the previous factors mentioned. By doing so, the institution can promote a comprehensive approach to training students and advancing knowledge. Through teaching, the university can equip students with practical skills and theoretical knowledge, preparing them to face the challenges of the job market. Universities have a crucial role to play in the innovation ecosystem, serving as hubs of knowledge creation, talent development, and technology transfer." (Etzkowitz, 2008). Research allows the continuous search for new knowledge and discoveries, fueling the advancement of

science and technology researches have verified that collaborative innovation of government-university-industry has a positive effect on the improvement of innovation performances and breakthrough of key technologies (Cassiman and Veugelers, 2002; Hoang and Rothaermel, 2005)

Furthermore, university extension extends the institution's reach to the community, providing services and programs that contribute to social and economic development. The third mission of universities involves fostering a culture of innovation, entrepreneurship, and social responsibility through initiatives such as technology transfer, industry partnerships, and community outreach." (Carayannis & Campbell, 2009). Finally, innovation is essential to boost academic excellence and promote progress in diverse areas. By integrating these four pillars - teaching, research, extension, and innovation - in a harmonious way, the university can fulfill its mission more effectively and contribute significantly to society and the advancement of knowledge.

The university, then can have these elements presented in the framework together resulting in a dynamic interplay where the knowledge generated within universities becomes a pivotal force within territorial IEs. Universities contribute not only to economic development but also to transformative learning experiences that drive personal and collective change.

In the context of methodology, universities utilize innovative teaching methods and transformative learning approaches to equip students with the skills and mindset necessary to thrive in dynamic and entrepreneurial environments (Davies & Easterby-Smith, 2003). This involves employing experiential learning techniques, such as case studies, problem-based learning, and project-based learning, which encourage students to engage actively with real-world challenges and develop critical thinking, problem-solving, and collaboration skills. By integrating these methodologies into curricula, universities create opportunities for transformative learning experiences, where students not only acquire knowledge but also undergo personal and professional growth, challenging their assumptions, beliefs, and perspectives (Mezirow, 1991).

Through transformative learning, students are encouraged to reflect critically on their experiences, confront societal norms and biases, and envision alternative futures (Cranton, 2006). Universities facilitate this process by creating inclusive and supportive learning environments that encourage dialogue, diversity of perspectives,

and experimentation. By engaging students in hands-on research projects, internships, and entrepreneurial activities, universities enable them to apply theoretical concepts to real-world contexts, fostering deeper understanding and mastery of subject matter.

Moreover, universities employ participatory research methodologies that involve collaboration with local actors, communities, and industry partners, ensuring that research outcomes are relevant, actionable, and beneficial to the broader ecosystem (Stake, 1995). Through participatory action research, universities empower stakeholders to co-create knowledge, identify challenges, and develop innovative solutions, thereby promoting social change and sustainable development (Reason & Bradbury, 2001).

Universities recognize the pivotal role of innovation infrastructure in fostering the innovation process. Promoting Responsible Innovation: Stake (1995) highlights the importance of universities in promoting responsible innovation. This entails integrating ethical considerations, sustainability principles, and a focus on social impact into research and innovation activities. Through emphasizing these values in teaching, research, and partnerships, universities ensure that innovation contributes positively to societal well-being.

Davies and Easterby-Smith (2003) advocate for a culture of continuous improvement within universities. Embracing feedback and adapting approaches in response to evolving needs and challenges are essential aspects of this culture. By fostering an environment of innovation and learning, universities remain agile and resilient in the face of change.

Applied Research encourages faculty and students to conduct research with practical applications. Emphasize projects that address real-world challenges and contribute to industry development. A regular maintenance and oversight of the gradual establishment of a culture of research and innovation. and a concrete plan on how the students can be involved in research and innovation (Lunag Jr et al., 2023)

Another aspect highlighted in the framework is Global Engagement, as Lundvall (1992) emphasizes the importance of universities engaging with global partners and networks. Collaboration on research, knowledge exchange, and addressing global challenges are central to this engagement. By fostering

international collaborations, universities enrich their innovation ecosystem and contribute to the formation of global innovation networks.

The framework created also brings other key factors as universities hold a vital role in both communicating their innovation endeavors and advocating for policies conducive to innovation and entrepreneurship. Through strategic communication efforts, universities may utilize various channels like social media, blogs, podcasts, and online forums to disseminate information about their innovation initiatives. Moreover, universities actively engage in policy advocacy to support innovation at different levels, lobbying policymakers, contributing expertise to policy debates, and shaping regulatory frameworks (Etzkowitz, 2017; Leydesdorff & Etzkowitz, 1998). By advocating for conducive policy environments, universities aim to remove barriers to innovation, attract investment, and drive economic growth (Edler & Yeow, 2016).

Public engagement is another crucial aspect, where universities organize events such as public lectures and workshops to showcase research findings and social impact projects by involving stakeholders and soliciting feedback, universities demonstrate their commitment to addressing societal needs (Godin, 2006; Sanders, 2012).

Furthermore, partnership development is key to amplifying the impact of university innovation efforts (Bennett & Gadlin, 2012). Collaborations with industry, government, non-profits, and international institutions through initiatives like research consortia and technology transfer programs enable universities to tackle complex challenges and drive economic development (Carayannis & Campbell, 2009; Garnsey et al., 2016). This holistic approach to communication, advocacy, public engagement, and partnership development enhances the visibility and effectiveness of university innovation activities.

Universities adopt a multifaceted approach to assess the impact of their innovation initiatives, utilizing metrics such as patents granted, startups launched, licenses executed, and revenue generated (Garg et al., 2020). These quantitative measures, complemented by qualitative indicators like societal impact and user satisfaction, provide a comprehensive understanding of innovation effectiveness (Huang et al., 2019).

Recognizing the diverse nature of innovation impact, universities embrace a holistic assessment framework (Hossain et al., 2021). Economic, social, and environmental dimensions are considered, evaluating factors such as job creation,

industry diversification, knowledge dissemination, and community engagement. This comprehensive approach ensures that innovation activities align with sustainable development goals and contribute to societal well-being.

Universities prioritize longitudinal analysis to capture the evolving trajectory of their innovation efforts (Li et al., 2021). Tracking progress over time enables them to identify emerging trends, patterns, and opportunities within the innovation ecosystem. Regular assessments and benchmarking against peer institutions facilitate continuous improvement, driving innovation agendas forward.

Universities actively engage stakeholders, including industry partners, government agencies, and community organizations, to define meaningful metrics and assess impact collaboratively. This participatory approach fosters transparency, accountability, and trust, reinforcing the university's commitment to driving positive change through innovation (Zeng et al., 2020).

The framework not only serves as a practical roadmap for universities but also accentuates the crucial role of transformative learning and responsible innovation in shaping future-ready graduates and making enduring contributions to society.

The concept of an "innovation ecosystem," as described by Granstrand and Holgersson (2020), emphasizes the dynamic and interconnected nature of innovation processes. It highlights the importance of various elements, including actors, activities, artifacts, institutions, and relationships, all of which contribute to the innovative performance of individuals or groups within the ecosystem.

When considering the role of universities in this context, transformative learning becomes a crucial aspect. Universities serve as key actors within the innovation ecosystem, providing the necessary resources, expertise, and platforms for transformative learning experiences. Through transformative learning, individuals within the university community—students, faculty, researchers—engage in a process of critical reflection, personal growth, and skill development, which are essential for driving innovation.

Universities facilitate transformative learning by offering interdisciplinary education, experiential learning opportunities, and collaborative research projects. These initiatives enable individuals to challenge existing paradigms, explore new ideas, and develop innovative solutions to complex problems. Moreover, universities foster a culture of innovation and entrepreneurship, encouraging risk-taking, experimentation, and creativity among their members.

In essence, universities play a vital role in shaping the innovation ecosystem by nurturing the transformative learning experiences of individuals. By equipping students and faculty with the knowledge, skills, and mindset needed to thrive in dynamic environments, universities contribute to the overall innovative performance of the ecosystem. Thus, the connection between the concept of an innovation ecosystem and the role of the university through transformative learning underscores the significance of education in driving innovation and societal progress.

7. FINAL REMARKS

This study deliberated over the university's contribution to the innovation ecosystem through transformative learning experiences. In addressing the first objective, analyzing MBA courses linked to innovation ecosystems, this investigation delved deep into the intricate process of the university's engagement in establishing an MBA course. The collaborative endeavors of UFRGS, PUCRS, and UNISINOS within the Alliance for Innovation were scrutinized, dissecting the phases involved in the conception and implementation of the MBA program. This scrutiny not only brought to light the structural dimensions of the course but also provided valuable insights into the motivations, strategic considerations, and challenges encountered throughout its establishment.

After studying the results, it's clear that working together in innovation alliances is really important for making progress. When universities, companies, and society all come together, it creates a great environment for new ideas and big changes to happen. In this mix, Pacto Alegre is like the key piece that holds everything together, helping to encourage innovation, build partnerships, and lead the way in making big changes. Also, the MBA program in Innovation and Entrepreneurship (IE) is perfect for the needs of today. It's different from traditional programs because it focuses on helping people learn in a new way that prepares them for the challenges of today's world. This study shows how important this kind of learning is for shaping the future generation of professionals who can tackle tough problems with creative thinking and flexibility.

In exploring transformative learning, guided by Mezirow's transformative learning theory (Mezirow, 1979), it was possible to delineate the fundamental elements contributing to a profound shift in participants' perspectives. By closely examining the curriculum, pedagogical philosophy, and learning experiences within the MBA program, this study identified essential components such as a collaborative mindset, practical application, dialogue, and the diversity of actors. These elements were recognized as pivotal in fostering transformative learning experiences.

Transformative learning, central in the MBA, emerges in this research as a catalyst to developing essential abilities, mainly the capacity to reflect critically, apply knowledge from theory into practice and adaptability to dynamic environments. This

educational perspective focuses on forming professionals prepared to deal with innovative contexts. More than another course, an MBA that is central to an IE, offers opportunities for real changes and transformative learning to those who are involved.

At the core of the research was the identification and analysis of collaborative actions within the innovation ecosystem. The Alliance for Innovation and Pacto Alegre emerged as notable examples, illustrating the interconnectedness of universities, companies, government entities, and civil society. The findings underscored the significance of these collaborations in propelling innovation, breaking down barriers, and cultivating a dynamic environment conducive to transformative learning experiences.

Drawing on the experiences unveiled, strategic insights for universities to actively contribute to innovation ecosystems were formulated. The research highlights the importance of universities adopting entrepreneurial and transformative roles, expanding their functions beyond traditional teaching and research. Furthermore, emphasizing neutral and ethical engagement was underscored as essential for building trust and nurturing effective partnerships within the innovation ecosystem. This collaborative and transformative stance positions universities as key contributors to the ongoing development of dynamic innovation ecosystems.

The research successfully achieved its objectives in exploring how universities contribute to the innovation ecosystem through transformational learning experiences.

Analyzing University Participation: Through meticulous examination, the study delved into the intricate process of how universities engage in creating experiential learning opportunities tailored to the innovation ecosystem. By dissecting this participation process, the research shed light on the crucial role universities play in fostering innovation through hands-on learning experiences.

Mapping Transformative Learning Elements: The research thoroughly mapped the key elements of transformative learning within the university context. By identifying these elements, such as collaborative mindset, practical application, and diversity of actors, the study provided valuable insights into how transformative learning experiences are cultivated within university programs.

Identifying Collaborative Activities: Through comprehensive analysis, the research identified various collaborative activities among stakeholders involved in the innovation ecosystem. By recognizing these activities and their contributions, the

study highlighted the interconnectedness of universities, companies, government entities, and civil society in driving innovation and fostering a dynamic environment for transformative learning experiences.

Proposing a Theoretical-Practical Framework: Building upon the findings, the research proposed a theoretical-practical framework delineating the university's roles in catalyzing innovation within the ecosystem through transformative learning. This framework serves as a roadmap for universities to actively contribute to the innovation ecosystem by adopting entrepreneurial and transformative roles, expanding beyond traditional teaching and research functions, and fostering effective partnerships.

Overall, the research successfully achieved its objectives by providing a comprehensive understanding of how universities contribute to the innovation ecosystem through transformational learning experiences

The evidence gathered in this study corroborates with the theories in the innovation ecosystem (Etzkowitz, 1998; Tolstykh, Gamidullaeva and Shmeleva, 202; Cruz-Amarán et al, 2020; Faccin et al, 2021, Thomas et al, 2020, Heaton et al., 2019). Especially concerning the proposals that strong and diverse partnerships act as powerful strategies and foster innovation, as well as the fact that collaboration is a key element to creating the right conditions for valuable innovation. These contributions endorse the existing literature, showing that the links forged by the IE helix are precious items and cannot be replaced, as they create the strong bonds that will assist the actors, helping innovation to fulfill itself.

Adding to the existing literature, this study revealed that, considering the university's role in IE, especially the students' role, there is a gap. Students feel as if they are treated as lesser actors inside the innovation ecosystem, which may be true considering the power structure that is embedded in all social interactions, even more so in a collaborative environment that has private companies, governmental agents and professors. The students become the youngest and less experienced link, but nonetheless, it does not mean they are weak. Possibly their very own youth and less experienced lives lead them to be fearless and more openly creative, which is something priceless in an innovation ecosystem. Therefore, this research strongly advises IE to enhance students' role as more active and relevant actors.

Finally, this study's findings correlate the diversity of participants with a richer transformative learning. Not only does the innovation ecosystem become better and

more profound, but it produces real transformative learning experiences. Also, the broader the network, the bigger the impact it creates on academic mastery and career paths, mainly for the students. It creates waves that will resonate in lives for longer periods.

The challenges faced by the MBA course studied provide insights on how important it is to be able to adapt. Articulating with society's needs, and constantly facing changes and new dynamics in the innovation ecosystem are strategies that transformative learning has provided to students. The MBA and the university create a social, economic and technological impact that nurtures regional development, promoting sustainable development and attracting talents and new investments. This means the MBA goes beyond the university borders and impacts society.

These theoretical advances were supported by the evidence gathered in this research. The evidence helped create a more practical result, a framework which came from the analysis and highlights the main points about the core university role in an innovation ecosystem.

This framework runs as a path, linking the most useful purposes that the university has in an innovation ecosystem, acting as a beacon of knowledge and collaborative environment that transforms actors into better versions of themselves and impacts sustainably the regional context. The suggestions create a stronger and more active university role inside the innovative ecosystem.

Every research endeavor inherently grapples with limitations, and this study is no different. A notable constraint is the reliance on a single case as the basis for our investigation. However, it is crucial to underscore that the selected case is characterized by a distinctive and intricate context. This uniqueness contributes valuable and nuanced insights to our study, allowing for a more in-depth exploration of the specific dynamics and factors at play. While the limitation of a singular case is acknowledged, the richness and complexity inherent in this unique context provide a depth of understanding that might be challenging to achieve in a broader, more generalized study. Therefore, the limitation, in this case, is mitigated by the richness of the contextual details encapsulated within the chosen case study.

In-depth interviews, while offering a profound contextual understanding and intricate details, inherently possess limitations. While they unearthed discernible patterns, the scope was confined by the finite number of participants. The richness of information gleaned was tempered by the constraint of a limited pool of interviewees.

Moreover, time emerged as a critical factor. Despite the extended research period typically afforded to a thesis, it reached its culmination constrained by factors such as the exhaustion of interview opportunities and the temporal constraints faced by participants. This temporal limitation not only impacts the depth of insights gathered but also introduces the element of temporal distortion as recollections are subject to the passage of time. The interplay of these factors underscores the need to acknowledge the inherent constraints of the research methodology, emphasizing the balance between depth of understanding and the practical constraints that shape the investigative process.

Despite these limitations, this thesis is valuable for drawing meaningful remarks. Therefore, it is suggested that future studies could conduct a study that:

1- compares and contrasts innovation ecosystems and MBA programs or other courses on a global scale.

2 - Explores how different cultural contexts impact the effectiveness of transformative learning experiences.

3 - Investigate the interplay between individual (student), group (teamwork), and systemic (ecosystem) levels in facilitating transformative learning. This can reveal how micro and macro factors synergistically shape learning outcomes.

4- Investigate the underlying power structures within the UFRGS, PUCRS, UNISINOS alliance and the broader innovation ecosystem. This can reveal how power dynamics might impact student agency, participation, and access to transformative learning opportunities.

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APPENDIX A - INTERVIEW GUIDE

Interview script

Profile data

background job role how long in the position role in the creation/implementation of the course

1- General question: Can you tell how was the creation and implementation of the MBA of Innovation Ecosystem

- Who were the actors involved (how was it managed, responsibilities)
- Whose idea?
- Why was it created?
- What expectations? Impact/development expected?Were they achieved? (Short, medium, long term results)
- Financial purpose?
- Challenges
- Governance
- Main target

2- Can you describe some learning experiences, activities, and projects which enabled transformative learning and provided a positive result/impact in the Innovation Ecosystem?

1.1 Who were the actors involved (external and internal)
1.2 What were the activities carried out,
1.3 Artifacts created
1.4 Best results

3 - What is necessary to take into account when designing/considering a course/project on the ecosystemic level?

4 - Is it expected that with the courses, classes, and activities created by course, the students/alumni will be more of an entrepreneur/change agent, great employee/ autonomous? Did it happen? Do you know any example of that?

5 - Does the university develop new strategies to create a better community of actors and develop projects with them to develop the IE? Can you give an example

6- What is necessary to take into account (aspects) when designing/considering a course/project on an academic/pedagogical level (business area)? (public engagement, social engagement, open access, Diversity, governance, collaborative practices, curriculum)

7- How can the university provide a greater impact on the ecosystem while providing transformative learning for students? / Through the partnership between the universities and the creation of the MBA, what is the role of the university in the EI?

Students Interview guide

Profile data

background/ level /participation in any extracurricular activity

1- Before starting the MBA, were you familiar with IE? Pacto Alegre? Do you work with anything related to innovation in IE? Pacto Alegre?

2- Why did you decide to pursue an MBA in Innovation Ecosystem - what were the main aspects that led you to participate?

3- What were your expectations with the MBA (curriculum, subjects, professors, networking)?

4- Was there any specific subject, project, extension activity, or any specific moment that provided an insight, generated an inquiry, or had an impact on IE?

5- How was the involvement of various actors in the course?

6- How do you believe you can be an agent of transformation in IE, and if the MBA sought to develop agents of transformation in the ecosystem?

7- Did the MBA provide any transformative learning, something that changed your way of thinking or acting on a particular theme, subject (did any subject or activity enable this)? What elements facilitated this?

8 - Did the MBA directly or indirectly change the way you work, how do you perceive the innovation ecosystem?

9 - What is the role of the university in IE?