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ORIGINAL ARTICLE

The transition between research, entrepreneurship and innovation: The case of an ecosystem orchestrating organisation

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Abstract

Purpose – This study examines the innovation trajectories adopted by a leading organisation and ecosystem orchestrator in order to structure and enable future innovations.

Theoretical framework – Orchestration theory (network and resource perspectives), ecosystem lenses (knowledge, entrepreneurship and innovation) and open innovation mechanisms explain how a focal incumbent converts science into market value.

Design/methodology/approach – A qualitative single-case study of the largest private healthcare organization in Latin America was conducted. Semi-structured interviews were conducted iteratively with executives, managers and stakeholders, resulting in a conceptual framework for ecosystem orchestration.

Findings – The study reveals that the organisation acts as an orchestrator, bridging the gap between research and market-driven innovations. Inbound and outbound open innovation play a crucial role in strategic collaborations. Infrastructure, intellectual property and technology transfer help to mitigate uncertainties and support scalability.

Practical & social implications of research – We contribute to the understanding of ecosystem orchestration by integrating knowledge, entrepreneurship and innovation. Established organizations can catalyse innovation through open innovation models. The practical contributions for organisations looking to integrate open innovation models include fostering cross-sector collaboration, supporting intrapreneurs, optimising knowledge flow, mitigating risks and accelerating technology commercialisation. As social contributions accelerate the science-to-solution process in healthcare, they improve outcomes and system efficiency.

Originality/value – This study integrates orchestration and ecosystem perspectives to demonstrate how incumbents can catalyse innovation via inbound and outbound open innovation. It offers a transferable framework for managing the transition from research to market.

Keywords: Knowledge ecosystem, entrepreneurship ecosystem, innovation ecosystem, ecosystem orchestration, open innovation.

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1 Introduction

Entrepreneurship involves the continuous pursuit of opportunities and innovation; it is a mindset that is essential for finding new solutions (Foss & Klein, 2012). Within innovation ecosystems, knowledge flows (Miller et al., 2016) and actor mobility (Järvi et al., 2018) are central in value creation. Entrepreneurs must navigate diverse ecosystems, which may comprise multiple organisations or be embedded within a single institution.

Innovation enables the creation and capture of value through novel and complex value propositions, which align with the core attributes of technology-based ventures and deeptech firms. Deeptech projects develop advanced technologies to address significant societal challenges. These projects involve high risk but offer substantial benefits. Such ventures depend on research ecosystems that facilitate the transition from science to entrepreneurship (Khanna, 2022; Marinelli et al., 2023), as well as the involvement of large firms that support research development (Herzog et al., 2024). Orchestrating companies provide resources and a network of strategic functions to develop innovations (Harima et al., 2024). They are usually centred on a focal firm, technology, platform or value proposition (Autio & Thomas, 2022; Ritala et al., 2013), enabling established organisations to drive their growth.

Studies have emphasised the importance of ecosystems in innovation, highlighting the dynamics of knowledge flow (Miller et al., 2016) and the mobility of individuals as key drivers of value creation (Järvi et al., 2018). However, few studies have examined the role of universities in ecosystem development and in bridging the gap between academia and industry (Rådberg & Löfsten, 2023). Similarly, few studies examine how large firms invest in technologies and infrastructure to advance innovation (Clarysse et al., 2014). Moreover, ecosystem dynamics are inherently complex and cannot be analysed in isolation; a deeper understanding of their evolution within entrepreneurship and knowledge ecosystems is required (Autio & Thomas, 2022). Additionally, there is limited research on the temporal co-evolution and transition of ecosystems in response to environmental shifts and stakeholder actions (Autio & Thomas, 2022; Silva & Grützmann, 2023).

More precisely, although there is research addressing how a company can orchestrate a regional ecosystem (Harima et al., 2024; Tabas et al., 2023), there is currently no research on how a company can lead an internal ecosystem. Internal ecosystems are described in the literature as configurations of interdependent organisational units, resources and innovation-support mechanisms that sustain the generation, development and advancement of innovation within the firm (Baik et al., 2019; Odei & Novak, 2024). Accordingly, innovation outcomes emerge from the alignment of multiple internal elements rather than from isolated organisational resources, which is consistent with the interdependence perspective emphasised in ecosystem research (Adner, 2017; Autio & Thomas, 2022). The internal ecosystem concept adopted in this study reflects an 'ecosystem-as-structure' perspective, in which the focal organisation intentionally coordinates multiple internal innovation environments (e.g. research, entrepreneurship and innovation) as interdependent subsystems (Adner, 2017). While innovation ecosystem research has advanced our understanding of ecosystem structure and orchestration, there is a lack of studies examining how ecosystems evolve, renew themselves and sustain innovation processes over time (Scaringella & Radziwon, 2018). Further investigation is therefore needed into how ecosystem transitions occur within the internal ecosystem structure of established firms and influence the trajectory of innovation (Gomes et al., 2024), particularly in organisations that evolve from knowledge to innovation ecosystems (Järvi et al., 2018; Valkokari, 2015). Therefore, research is needed to explore the interconnections involved in entrepreneurial transitions across internally orchestrated ecosystems.

Deeptech innovations stem from intensive research and knowledge generation, which is why research institutions are vital to their development (Valkokari, 2015). Given the broad and complex nature of the knowledge required for technology-based and deeptech ventures, it is important to understand the research environments that will enable future innovations. There has been an increasing focus on how entrepreneurs leverage ecosystems to drive such innovation. This study therefore asks: what innovation trajectories do leading organisations and ecosystem orchestrators follow to structure and enable future innovations? It explores the innovation trajectories adopted by a leading organisation to enable future innovations. Specifically, it analyses the transition of the entrepreneurial scientist across knowledge, entrepreneurship and innovation ecosystems within a single business model.

The role of leading organisations as orchestrators of interconnected ecosystems is an underexplored topic in the literature. This study addresses this gap by conducting an in-depth case study of the largest private healthcare organisation in Latin America. This organisation acts as a leader and orchestrator of knowledge, research, entrepreneurship and innovation ecosystems. The organisation operates as a hybrid innovation structure, developing deeptech research initiatives alongside other knowledge-intensive healthcare innovations, including clinical, technological and operational solutions, all within the same ecosystem architecture. This case study presents the unique phenomenon of the organisation managing the transition of innovation projects across these ecosystems. In the healthcare sector in particular, it is important to examine how organisations orchestrate research, entrepreneurship and innovation activities in order to create ecosystems that can generate market-driven innovations.

This study advances the understanding of ecosystems integrated within a focal organisation by contributing to theory. The research highlights the role of the orchestrating organisation in connecting knowledge, entrepreneurship and innovation ecosystems and in linking knowledge production to market value (Harima et al., 2024; Järvi et al., 2018; Miller et al., 2016; Tabas et al., 2023). This aligns with literature on deeptechs and science-based innovation, which emphasises the importance of a robust research environment in supporting the transition from science to market (Khanna, 2022; Marinelli et al., 2023). The study also offers practical insights into ecosystem orchestration and innovation development within a unified ecosystem structure. The findings are expected to enhance our understanding of ecosystems, business models, inter-ecosystem transitions and the integration of technology and innovation within a single business model.

2. Theoretical framework

2.1 Orchestration theory

Orchestration theory provides a framework for understanding how leading organisations coordinate networks and resources within innovation ecosystems. It examines the role of hub companies in managing inter-organisational innovation networks (Dhanaraj & Parkhe, 2006; Harima et al., 2024; Reypens et al., 2021; Tabas et al., 2023), as well as how they structure, combine and mobilise assets to generate competitive advantage (Helfat et al., 2007; Sirmon et al., 2011). From a network perspective, orchestration involves the deliberate actions taken by the hub company to build and manage innovation networks (Dhanaraj & Parkhe, 2006; Harima et al., 2024). From a resource perspective, it focuses on configuring and allocating assets to expand capabilities and respond to dynamic environments (Helfat et al., 2007; Sirmon et al., 2011). This perspective captures the evolutionary nature of orchestrators' engagement, enabling them to catalyse the co-evolution of resources and actors and align organisational and strategic objectives. Within the ecosystem literature, this coordinating role is often associated with focal or anchor organisations that intentionally align complementary actors and activities to enable innovation outcomes across interconnected ecosystem layers (Adner, 2017).

Orchestration theory has been applied in various inter-organisational settings, including innovation ecosystems and entrepreneurship, each with its own particular focus. Integrating network and resource dimensions clarifies how anchor organisations exercise strategic leadership (Helfat et al., 2007; Reypens et al., 2021). This also highlights the dynamic nature of their engagement, involving actions that mobilise and enhance capabilities to promote asset co-evolution (Helfat et al., 2007). From a typological perspective, innovation ecosystems frequently interact with knowledge, entrepreneurship and business ecosystems. Together, these ecosystems support the progression from knowledge creation to entrepreneurial experimentation and market-oriented innovation. This view is supported by research indicating that innovation ecosystems evolve from the intersection of knowledge, entrepreneurship, innovation and business activities. In this context, orchestrating organisations influence the sharing of knowledge, coopetition, complementarities and interdependencies among stakeholders, thereby reinforcing entrepreneurial activities and facilitating value co-creation across the ecosystem (Scaringella & Radziwon, 2018). This makes orchestration theory a valuable framework through which to examine how these organisations build and sustain ecosystems that innovate, compete and evolve through intentional and adaptive actions.

2.2 Perspectives on the knowledge ecosystem

Collaboration between academia and industry is a critical driver of technological progress and innovation (Khanna, 2022). Studies emphasise the importance of institutional support in enabling academics to engage in entrepreneurial activities (El Houari & Fakhreddine, 2024; Miller et al., 2016), as well as the need for more efficient knowledge transfer from universities to industry. From an ecosystem perspective, these collaborative arrangements are often coordinated by focal organisations that facilitate knowledge creation, resource sharing and inter-organisational collaboration across institutional boundaries (Adner, 2017).

Given the complex knowledge required for deeptech innovations, it is important to understand how research environments can encourage future innovations. In the context of ecosystems, this understanding is a critical tool for scientists seeking to generate them. A knowledge ecosystem comprises knowledge-producing actors, such as universities, research institutions and firms, which collaborate to explore and develop research that generates new knowledge (Clarysse et al., 2014; Järvi et al., 2018; Valkokari, 2015). It provides an environment in which researchers and innovators can share information and develop research and knowledge. These ecosystems reflect increasingly open research and innovation processes, producing system-level results (Autio & Thomas, 2022; Järvi et al., 2018; Valkokari, 2015). Deeptech research is the result of large knowledge ecosystems, with universities and research centres playing a fundamental role in their development (Valkokari, 2015). Within the broader ecosystem literature, knowledge ecosystems are often considered complementary to entrepreneurship and innovation ecosystems. Together, they form interconnected layers that support the progression from knowledge production to entrepreneurial experimentation and market application (Scaringella & Radziwon, 2018).

While knowledge ecosystems focus on the collaborative creation and exploration of scientific knowledge, entrepreneurial ecosystems are oriented towards transforming such knowledge into viable ventures and market-driven innovations. The transition from knowledge to entrepreneurship ecosystems involves the mobilisation of research outputs and the reconfiguration of institutional, technological and business resources to support venture creation and growth (Stam, 2015). Understanding how actors, particularly entrepreneurial scientists, navigate this transition is essential for realising the full innovation potential of integrated ecosystems.

2.3 Perspectives on the entrepreneurship ecosystem

Entrepreneurial ecosystems are structured around entrepreneurial activity and comprise interconnected actors, such as entrepreneurs, firms, educational and research institutions, government bodies, venture capitalists, accelerators, co-working spaces, makerspaces and other specialised participants, which collectively support entrepreneurial activity (Autio & Thomas, 2022). Within these ecosystems, participants seek financial and non-financial resources to expand entrepreneurial opportunities and discovery processes (Marinelli et al., 2023). From an ecosystem orchestration perspective, focal organisations and institutional actors often coordinate these participants, resources and support mechanisms to enable entrepreneurial experimentation and venture development (Adner, 2017; Khanna, 2022).

Entrepreneurial ecosystems have emerged as a strategy for regional economic development, encouraging the growth of innovative startups. Collaboration between research domains, industry and markets is critical for successful innovation outcomes (Khanna, 2022). However, building an entrepreneurial ecosystem that links universities with established firms also requires government support during the early stages of development. For such collaboration to take root, universities – as the starting point of research ecosystems – must facilitate the translation of scientific knowledge into entrepreneurship (Khanna, 2022; Marinelli et al., 2023), as well as encouraging the active involvement of large firms in supporting entrepreneurial activities derived from scientific research (Herzog et al., 2024). Such ecosystems depend on the integration of scientific knowledge, entrepreneurial experimentation and institutional support in order to enable coordinated innovation trajectories within orchestrated environments. In this sense, entrepreneurial ecosystems can be interpreted as an intermediate layer connecting knowledge ecosystems and innovation ecosystems, where orchestration mechanisms help to align research outputs, entrepreneurial initiatives and market opportunities across ecosystem typologies (Adner, 2017; Scaringella & Radziwon, 2018).

2.4 Perspectives on the innovation ecosystem

Ultimately, innovation ecosystems support firms in delivering value propositions to customers (Autio & Thomas, 2022). They comprise interdependent actors who play different roles in knowledge and value creation processes (Adner & Kapoor, 2010). They enable value

creation and capture through novel, complex value propositions and are usually organised around a focal firm, technology, platform or value offering (Autio & Thomas, 2022; Ritala et al., 2013). They connect early-stage discovery with market application (Järvi et al., 2018; Valkokari, 2015). From an orchestration perspective, focal organisations coordinate complementary actors and resources to enable innovations to progress from development to market implementation (Adner, 2017).

Ecosystems are dynamic systems that evolve in response to environmental changes, shifts in actors and technological transformations (Autio & Thomas, 2022; Silva & Grützmann, 2023). According to ecosystem theory, continuous innovation drives the co-evolution of the ecosystem over time (Silva & Grützmann, 2023). Industry offers a more effective pathway for translating innovations developed within knowledge ecosystems into practical applications, such as products and services (Khanna, 2022). Consequently, ecosystem architecture reflects phase transitions between ecosystems and the strategic implications of actor behaviour within them (Autio & Thomas, 2022). These transitions can be interpreted as coordinated movements across ecosystem typologies, where orchestration mechanisms help to align technological development, entrepreneurial initiatives and market opportunities over time (Adner, 2017; Scaringella & Radziwon, 2018). In this context, the business model is a vital tool for enabling the co-evolution of business strategies.

2.5 Innovation trajectories and inter-ecosystem transitions

Although orchestration theory explains how focal organisations coordinate resources and actors within ecosystems, it offers little insight into how innovation processes evolve across interconnected ecosystem layers. This study therefore conceptualises innovation trajectories as ecosystem-embedded processes, examining how inter-ecosystem transitions enable the progression of innovation initiatives across organisational environments.

Here, innovation trajectories are understood as structured pathways through which knowledge, research projects and entrepreneurial initiatives evolve into market-oriented innovations within an ecosystem context. In this study, the unit of analysis for innovation trajectories is the innovation initiative (e.g., a research project, an internal entrepreneurial project or a startup-related innovation) as it progresses across different organisational environments. These trajectories are shaped by the interaction between organisational capabilities, institutional infrastructure and ecosystem actors (Autio & Thomas, 2022; Clarysse et al., 2014).

In knowledge-intensive, science-based contexts, innovation rarely follows a linear process. Instead, it emerges from iterative interactions among research environments, entrepreneurial initiatives and mechanisms for innovation development (Järvi et al., 2018; Miller et al., 2016). Unlike technological trajectories (Dosi, 1982) or the evolutionary paths of firms and routines (Nelson & Winter, 1982), which primarily describe technological or industrial evolution over time, the innovation trajectories analysed in this study refer to organisationally orchestrated pathways within a focal firm that integrate research, entrepreneurship and innovation ecosystems. Thus, the concept is used here to capture the coordination of innovation initiatives across ecosystem layers, rather than long-term technological evolution.

Within orchestrating organisations, innovation trajectories often involve multiple organisational environments that can be conceptualised as interconnected ecosystems. Knowledge ecosystems support research production and scientific development; entrepreneurship ecosystems enable opportunity recognition and venture creation; and innovation ecosystems focus on validation, scaling and commercialisation processes (Järvi et al., 2018; Valkokari, 2015). Interaction between these ecosystems is particularly important in contexts involving deep technology and science-based innovation, where the transition from research to market requires coordination between different capabilities and institutional arrangements (Khanna, 2022; Marinelli et al., 2023).

Inter-ecosystem transitions refer to the movement of actors, knowledge and innovation projects between interconnected ecosystem layers within an organised, orchestrated environment. Such transitions occur when research results evolve into entrepreneurial initiatives, internal projects or startups enter validation and experimentation environments, or innovation initiatives are integrated into commercialisation processes. Such transitions are supported by mechanisms such as intellectual property management, technology transfer, validation infrastructure, open innovation practices and venture-building initiatives. These mechanisms reduce uncertainty and enable science-based innovations to progress towards market application (Autio & Thomas, 2022; Clarysse et al., 2014).

From this perspective, innovation trajectories are ecosystem processes shaped by actor mobility and knowledge flows, as well as technological or organisational processes (Järvi et al., 2018; Miller et al., 2016). The ability of a focal organisation to coordinate these transitions is particularly important in contexts where research, entrepreneurship and innovation activities are integrated within a single organisational structure. By orchestrating these interconnected environments, the focal organisation can facilitate the transformation of knowledge into innovation while aligning ecosystem actors with strategic objectives (Gomes et al., 2024; Harima et al., 2024).

3 Methodology

The role of organisations as innovation orchestrators has attracted academic interest. This study uses an inductive, qualitative, single-case design, which is well-suited to analysing complex organisational processes (Gioia et al., 2013; Yin, 2009). A single case has been selected for study because the organisation in question represents a significant phenomenon in terms of theory building: the integration of research, entrepreneurship and innovation ecosystems within a single organisational structure coordinated by an ecosystem-orchestrating organisation. It is recognised as one of the leading innovation-oriented healthcare institutions in Latin America, with a well-established research infrastructure and mature innovation ecosystem. This configuration enables the observation of innovation trajectories and inter-ecosystem transitions that would be difficult to access through multi-case designs.

In this study, we examine the institution using a combination of different units of analysis: the internal knowledge and research ecosystem; the external knowledge and research ecosystem; the internal entrepreneurship ecosystem; the external entrepreneurship ecosystem; the internal innovation ecosystem; the external innovation ecosystem; and the transition between all the of these ecosystems. We conducted interviews with executives, managers and leaders of internal entrepreneurship initiatives with spin-off potential that transition into internal or external ecosystems. Our aim is to understand how innovation and entrepreneurial projects are developed and supported. Theoretical sampling was used to select projects with strong innovation capabilities and managers with experience in corporate entrepreneurship. Including projects from various areas ensured diversity in ecosystem orchestration.

Our methodological approach is an inductive qualitative analysis aligned with the Gioia methodology (Gioia et al., 2013), enabling systematic and transparent theory building from qualitative data. This approach is consistent with the coding structure presented in the results section, which moves from first-order informant terms to second-order themes and aggregate dimensions. The Gioia methodology was followed for the overall research design and data analysis.

Data were collected through a combination of semi-structured interviews and secondary materials, such as website content, videos and grey literature, which were provided by the focal organisation. The secondary materials were primarily used to provide a contextual understanding of the organisation, its innovation programmes and the structure of its ecosystem. While triangulation helped to shed light on the organisational context and innovation initiatives, the analysis focused on interview data as the phenomenon under investigation is not well documented in the literature.

The interviews, which focused on projects that had been in development for at least two years, were conducted in 2024. The interview protocol focused on ecosystem orchestration, innovation trajectories, project development, and transitions between research, entrepreneurship and innovation environments. Three interview protocols were developed to capture the perspectives of different stakeholders in the innovation ecosystem: one for managers of the focal organisation, one for startup entrepreneurs participating in the ecosystem, and one for intrapreneurs leading internal innovation projects. Five initial interviews were held to map the organisational structure. Many participants were involved in multiple stages of innovation and appeared in different segments of the research. In total, 31 interviews were conducted, representing various phases of the projects.

Theoretical sampling guided the selection of participants, prioritising individuals who were directly involved in research, entrepreneurship, venture building and innovation initiatives within the organisational ecosystem. The interviews were conducted online or in person, typically lasting between 45 and 90 minutes. The interviewees included six Entrepreneurship Project Coordinators, six Innovation Project Leaders linked to spin-off initiatives, four Startup Leaders in the incubation process, three Intellectual Property Managers, two Venture Building Managers, two Incubator professionals (one manager and one analyst), one Strategy Manager, one Research Scientist, and two Directors.

This diversity of roles enabled the study to capture multiple perspectives across the organisation's research, entrepreneurship and innovation ecosystems.

Data analysis followed an iterative and abductive process, alternating between emerging theory and empirical evidence and incorporating constant comparison with existing literature. To ensure methodological rigour, we applied established coding techniques (Gioia et al., 2013).

- Stage one: Consolidation of interview data, secondary sources and organisational information on ecosystem orchestration, identifying initiatives such as corporate innovation programmes and new venture strategies.
- Stage two: Open coding identified key concepts relating to ecosystem and project orchestration (e.g., decision-making processes, research incentives, spin-off structuring), forming first-order concepts as the basis for aggregated categories.
- Stage three: The research team compared the findings with the literature, refining insights and defining the most relevant codes.
- Stage four: The categories were grouped into twelve analytical dimensions, eight of which formed the thematic structure. Six core aggregated dimensions were defined to guide the innovation pipeline and two transitions. Figure 1 illustrates the categorisation and flows of innovation.
- Stage five: A process framework was developed to describe the most common innovation pathways. Figure 2 summarises the emerging theoretical framework and illustrates the various innovation trajectories.

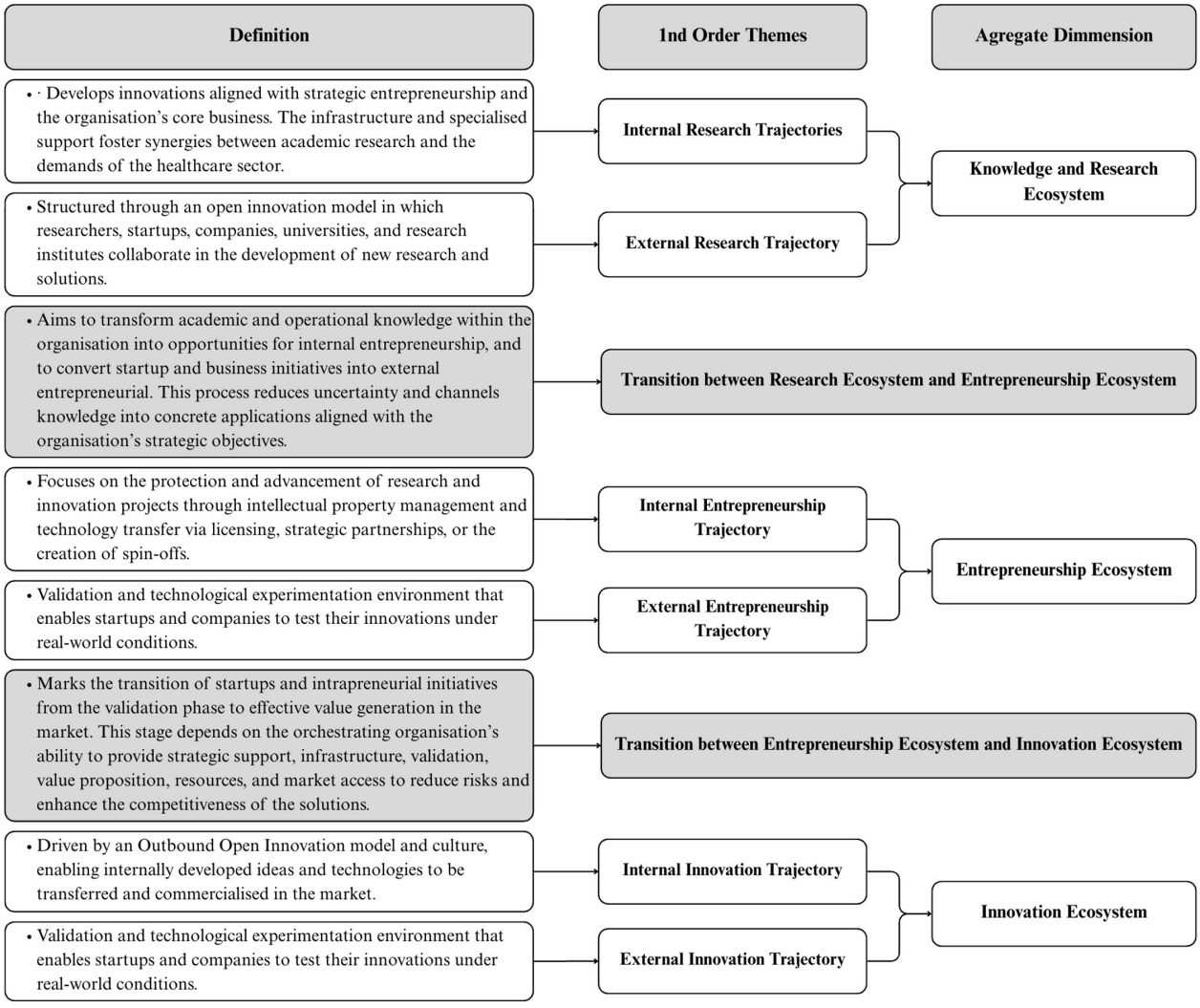

Figure 1. Code structure.
Source: Research Data.

- Final validation: The findings were presented to two organisational managers for discussion of the innovation pathways and validation of the orchestration logic. Project managers were not included in this stage of the validation process because many projects were still under development and followed distinct trajectories across ecosystems, which could limit cross-case comparison during validation. Instead, validation focused on organisational-level interpretation of ecosystem orchestration and innovation trajectories.

All 31 interviews were used in the coding process, contributing to the development of first-order concepts, second-order themes and aggregate dimensions. To preserve confidentiality, interviewees were identified using anonymised codes comprising the participant's organisational role followed by the interview number in chronological order. Only a subset of the interviews is quoted directly in the results section, in order to preserve clarity and avoid redundancy. Excerpts that most clearly illustrate the identified analytical dimensions were prioritised. The remaining interviews corroborated the emerging interpretations and reinforced the consistency of the findings across different organisational roles and innovation stages.

4 Results

4.1 Case study narrative

This section presents the analysis of the single case, developed inductively from the data collected on an organisation that orchestrates research, knowledge, internal and external entrepreneurship, and innovation ecosystems. The organisation operates in the healthcare and education sectors, offering integrated services. This hybrid configuration enables the organisation to develop deeptech research projects and other knowledge-intensive healthcare innovations simultaneously, combining advanced scientific research with applied clinical and operational innovation within a unified ecosystem structure. Operating in a continuously growing market, the organisation is one of the largest healthcare providers in Latin America and is recognised as one of the most innovative globally.

In addition to its growth and potential, the organisation is embedded in multiple health-related ecosystems, enabling the exploration of diverse market opportunities. It engages with various interdependent actors across internal and external ecosystems, each of which plays a specific role in value creation. While internal and external ecosystems are connected, this study analyses each stage separately for clarity.

The organisation can drive its own trajectory in developing research, entrepreneurship and innovation through internal and external projects, fulfilling the role of ecosystem orchestrator at each stage. It has structured internal areas dedicated to research, entrepreneurship and innovation, driving both internal and external research and entrepreneurial projects to enhance their development in the market. As strategic projects progress within the organisation's strategic framework, internal and external processes both aim to accelerate innovation in the market. The following sections present the categorised stages of the research that form the distinct ecosystems analysed.

4.2 Knowledge and research ecosystem

The knowledge and research ecosystem of the organisation under study is a complex system that integrates both internal and external research trajectories. These trajectories aim to foster innovation and scientific advancement cohesively. Due to its hybrid innovation profile, the organisation conducts deeptech-oriented scientific research alongside other knowledge-intensive healthcare projects. These range from advanced technological development to applied clinical and service innovations, all of which are integrated within the same orchestrated ecosystem. This dynamic is sustained by the interaction between research conducted within the organisation and collaborations established with external partners, including universities, hospitals and other organisations in the same sector.

4.2.1 *Internal research trajectory*

The internal research trajectory is a structured organisational pathway that mobilises research capabilities, strategic knowledge and institutional infrastructure in order to generate and apply knowledge. This ensures alignment with the organisation's core mission.

Strategic research is a key driver in the development of potential research and innovation projects that align with the organisation's core business. The research department conducts studies to develop applied healthcare solutions, promoting both basic and applied research. The research and teaching departments act as complementary hubs,

strengthening the integration of theory and practice. Professors and researchers play an active role in developing new projects. As Entrepreneurship Project Coordinator 13 states, '*The main support we provide is opportunities for engagement within the organisation*.' Strategy Manager 6 adds: '*We have the healthcare system as a strategic focus for teaching, research and innovation. [...] We work on this exact theme to align with corporate strategy*.' This demonstrates how the organisation leverages its intellectual capital through research, ideas and projects to foster its strategic entrepreneurship.

The organisation's infrastructure and support services provide a solid foundation for knowledge generation in operational areas. Its infrastructure and specialised workforce enable projects to be developed that align with internal demands in the healthcare sector. As Strategy Manager 6 mentions, '*We have access to infrastructure, data, people and financial resources. I believe that it's the exchange and synergies between these areas that bring the gains*.' Entrepreneurship Project Coordinator 13 adds: '*I see it in terms of projects that the organisation deems strategic and that are closely aligned with its strategy. These are things that will truly deliver value for the organisation*.' This highlights the organisation's infrastructure, support and commitment to fostering its internal research trajectory.

Internal research is led by specialised departments, including the institutional research sector and the affiliated university (which constitutes the organisation's strategic research) and the hospital unit (which forms the organisation's infrastructure and support). Together, the organisation's strategic research and know-how form the internal research trajectory, providing a clear pathway for ideas and projects.

4.2.2 *External research trajectory*

The external research trajectory involves the organisation collaborating with external partners, including universities, research institutes, startups, companies and public-private partnerships, through open innovation. This enables the co-creation and exchange of knowledge, as well as the development of market-oriented solutions. The organisation acts as a knowledge ecosystem, integrating various stakeholders into an open innovation model to develop solutions.

The organisation has strategic partnerships for scientific innovation with universities and research institutes. Open innovation grants access to advanced knowledge and emerging technologies, fostering joint projects. Strategic collaborations with startups and healthcare companies accelerate the scaling up of new solutions in the market. As Intellectual Property Manager 29 states, '*When we talk about co-development between two institutions, we're necessarily talking about co-development between researchers from both institutions. It's the people who develop it*.' Research Scientist 15 adds: '*We interact with the organisation's innovation when an external company approaches the research team. [...] Sometimes, there's direct interaction with the market*.' These approaches generate new knowledge and strengthen the organisation's role as a healthcare innovation hub.

The organisation also engages in public-private partnerships to enhance its innovation capacity. This cooperation between researchers and the market reflects the open innovation trend, enabling entities to share knowledge and resources in order to accelerate the development of new solutions. As Intellectual Property Manager 1 states, '*In cooperation, this innovative product can involve either the company or an innovation researcher from the organisation working together*.' Collaboration between academia and industry is essential for advancing research.

Another approach involves startup incubation and acceleration programmes, in which the organisation provides support from ideation to maturity. Innovation Project Leader 19 states: '*We're an accelerator; our goal is to help the startup or take that idea from paper and turn it into something real*.' This support brings together healthcare professionals and investors to ensure that innovative solutions are both viable and scalable in the market. Regarding the incubation process, Intellectual Property Manager 1 adds: '*The first relevant example would be the startups incubated within the organisation's ecosystem, which have access to professionals and the organisation's infrastructure for product development. [...] When these products reach the market, they can be explored commercially together, with shared value between the organisation and the startups*.' This ecosystem strengthens innovation and drives high-impact solutions.

An organisation's knowledge and research ecosystem is the configuration of its internal and external research trajectories. The internal research trajectory, based on the organisation's infrastructure and support, fosters projects that are aligned with the organisation's strategic research. The external research trajectory involves interactions between public and private actors to form strategic partnerships for scientific innovation.

4.3 Transition between the research and entrepreneurship ecosystems

The transition between research and entrepreneurship ecosystems is a crucial process for transforming academic knowledge into innovation. While deeptech initiatives represent a significant part of an organisation's innovation trajectory, these transition mechanisms also support other knowledge-intensive healthcare innovations. This reflects the hybrid nature of the ecosystem, which combines science-based technological development with applied healthcare solutions. In deeptech contexts, this transition is particularly critical due to technological uncertainty, the need for sufficient capital, intellectual property protection and regulatory validation requirements preceding market entry. Unlike in general innovation ecosystems, where opportunity recognition may precede technological development, here the trajectory begins with advanced scientific research that must progressively be structured towards commercialisation. This transition requires a well-structured innovation journey where ideas are developed until they reach a stage at which they can be created and offered for sale. As Entrepreneurship Project Coordinator 4 stated, '*There's a lot of clarity in this strategy; it's very well designed, […] having this innovation journey well mapped out helps ensure the idea doesn't fail at the project "gates" […] and that the idea doesn't get lost along the way*.' Having a clear trajectory suggests that promising knowledge initiatives are well aligned with entrepreneurial activities. This coordination requires the mobilisation of different areas and the creation of synergies between the various stakeholders, ensuring that internal strategies are aligned with societal and market demands.

In the context of the internal trajectory, the organisation uses internal entrepreneurship to assess new projects, identify opportunities and allocate resources for potential innovations. The organisation aims to structure and support innovative projects from conception to market solution validation. In the context of the external trajectory, the selection of startups for the incubation programme demonstrates their entrepreneurial, technical and market potential. Both internal and external models function as mechanisms that minimise uncertainty and guide decision-making to avoid market failure. As Entrepreneurship Project Coordinator 10 stated, '*There's a team focused on providing strategic innovation guidelines to facilitate decision-making regarding innovation*.' This process supports the development of external startups and internal spin-offs, ensuring that the knowledge generated by researchers is used to create practical solutions and guaranteeing that projects have a tangible impact.

4.4 Entrepreneurship ecosystem

The organization's entrepreneurship ecosystem undertakes activities to ensure the security of its research and projects. This stage combines the organisation's internal and external entrepreneurship trajectories. These trajectories aim to develop the entrepreneurial project, ensure its patentability and bring it to market as efficiently as possible.

4.4.1 *Internal entrepreneurship trajectory*

The internal entrepreneurship trajectory is a structured process through which the organisation can transform internally developed research into market-oriented products and services. This is achieved by strategically managing intellectual property (IP) and facilitating technology transfer to ensure the protection, validation and commercialisation of innovations.

IP management and technology transfer aim to protect research and projects while enabling the market offering of products and services. IP is managed strategically to protect scientific discoveries and new technologies through patents, trademarks, copyrights and trade secrets. As Intellectual Property Manager 29 noted, '*Intellectual property isn't an end in itself; it's part of a larger project, which is the creation of a product with market value*.' This approach enables promising technologies, products and services to be supported while the best strategies for their protection and commercial exploitation are defined. This mechanism is particularly important in deeptech ventures, where intellectual property protection is not just a strategic option, but often a prerequisite for attracting investment, mitigating technological uncertainty and ensuring appropriability in highly knowledge-intensive fields.

The organisation can develop technologies, products or services to offer to the market, either directly or through technology transfer. This process involves patent licensing, forming partnerships with companies and creating spin-offs, thereby ensuring that the organisation's research has a real societal impact. The cycle encompasses cooperation agreements and commercialisation strategies ranging from granting rights to established companies to creating startups to exploit innovations. As Entrepreneurship Project Coordinator 4 noted, '*An example of this is the development of products for the pharmaceutical and medical device industries, where the organisation acts as both a knowledge generator*

and a facilitator for the entry of these technologies into the healthcare sector.' Thus, IP and technology transfer are vital for turning research into practical innovations, promoting economic growth and scientific progress.

The organisation's infrastructure enables the design and testing of new technologies in a real-world environment, ensuring that advancements address concrete healthcare sector needs. The organisation aims to manage IP and technology transfer in order to protect its assets and introduce new products and services to the healthcare market. Therefore, the IP strategy is a key element in the dynamics of this ecosystem. The organisation's internal entrepreneurship trajectory plays a crucial role in protecting, structuring and preparing internally developed innovations for the validation and scaling processes that occur within the innovation ecosystem.

4.4.2 *External entrepreneurship trajectory*

The external entrepreneurship trajectory is the organisation's structured support for external startups and partner companies. It provides a robust infrastructure for technology validation and experimentation, enabling the testing, refinement and acceleration of innovations in real-world healthcare settings. This fosters market readiness, regulatory approval and social impact.

The organisation's entrepreneurship trajectory is distinguished by its technology validation and experimentation environment, which provides startups and partner companies with advanced resources to test their innovations in real-world settings. The hospital has clinical and pre-clinical research laboratories and a network of specialists and mentors to assist with the development of new products and services. As Incubator Innovation Manager 2 states, '*I have a pre-clinical and clinical research lab where you can validate your technology. I have several hospitals where you can validate your technology. I have diagnostic medicine where you can validate your technology. I have primary care where you can validate the technology. So I'm a health complex and, therefore, I can validate nearly every type of healthcare technology, whether clinical or focused on management and operational efficiency.*' Incubator Innovation Analyst 16 adds: '*Perhaps that's the most impactful part, as most startups seek that, validation, a pilot within the organisation. We've seen a lot of that […] validating studies, validating on patients, which is easy when you have a hospital.*' The managers emphasise that external partners are keen to access a technology validation and experimentation environment.

The technology validation and experimentation environment fosters close collaboration between academic and market research and development and hospital practice. This allows new technologies, medical devices and software to be tested in controlled conditions, thereby accelerating the validation and regulatory processes. With its robust infrastructure and strategic network of partners, the organisation facilitates connections between science and the market. The external entrepreneurship trajectory strengthens the competitiveness of startups and partner companies alike, promoting scientific and technological progress and a sustainable entrepreneurship ecosystem with social impact.

The organization's entrepreneurship ecosystem comprises both internal and external entrepreneurial trajectories. The internal trajectory focuses on protecting research and projects through IP management and technology transfer. The external trajectory emphasises validation and experimentation environments that transform projects into concrete technological solutions.

4.5 Transition between the entrepreneurship and innovation ecosystems

This transition represents a crucial moment in the innovation journey, where projects and startups move from experimentation and validation to creating market value. The results show that this transition is heavily influenced by the ability of the orchestrating organisation to provide the necessary resources to help startups and intrapreneurial initiatives structure their operations, acquire customers and integrate into the productive sector. As Entrepreneurship Project Coordinator 3 states, '*We foster this research, validate the need, support the solution design, and then prepare it to move forward with the next pillars of innovation.*' Intellectual Property Manager 29 adds: '*In the organisation's context, performing these stages is part of business creation*.'

Another key aspect of the transition between entrepreneurship and innovation is the continuous market validation of solutions. Successful execution of this transition depends on the ability to structure a robust business model that translates research outcomes into viable products and services. As Entrepreneurship Project Coordinator 10 stated, '*Depending on the project, if it's more focused on entrepreneurship, we still contribute to designing the value chain of the business,*

linking the value proposition, resources, activities and channels, allowing us to make a prospective financial plan of what we expect it to produce in the future.' In this way, orchestrating ecosystems facilitates the transition of scientific knowledge into the entrepreneurial realm, ensuring innovation is continuously nurtured, validated and refined while mitigating risks and strengthening the competitiveness and impact of the solutions.

4.6 Innovation ecosystem

The organisation's innovation ecosystem carries out activities to ensure the security of its research and projects. This stage combines the organisation's internal innovation and external innovation trajectories. These trajectories aim to bring innovation to market with a higher chance of success.

4.6.1 *Internal innovation trajectory*

The internal innovation trajectory is a structured process through which an organisation can transform internally generated knowledge into applied innovation. This is achieved by fostering a culture of innovation, promoting intrapreneurship and implementing outbound open innovation mechanisms. These mechanisms convert research, ideas and projects into market-ready solutions.

The outbound open innovation trajectory connects internal research and development with external market opportunities. In this context, venture building emerges as a structured model for transforming innovative ideas into sustainable businesses. Venture building supports the validation, scaling and market application of internally developed innovations, which may result in new companies being created from opportunities within the organisation. Regarding the organisation's research, Intellectual Property Manager 1 explains: '*A management team was created […] to focus on proprietary research projects […] that generated innovative products, transforming those products into market-ready products, potentially new companies*.' Entrepreneurship Project Coordinator 3 adds: '*We have projects, entrepreneurs and intrapreneurs along the way, eventually entering the venture building process*.' This approach aligns with the organisation's open innovation strategy, enabling the maturation and validation of internally developed scientific research and new technologies. These can then be transformed into spin-offs, patent licensing, or strategic partnerships with the private sector.

A culture of innovation is key to transforming ideas into results. To foster an innovative environment, teams dedicated to innovation and intrapreneurship must be created to identify opportunities, test new approaches and develop disruptive solutions. Additionally, the culture must be structured to encourage creativity and collaboration, where controlled failure is part of the learning process. As Intellectual Property Manager 1 notes, '*There are possibilities with diverse projects […] aimed at spreading the culture of innovation and generating new products*', Entrepreneurship Project Coordinator 8 adds: '*We have some employees we call ambassadors, those responsible for spreading the innovation culture within their areas*.'

4.6.2 *External innovation trajectory*

The external innovation trajectory is a structured process through which the organisation engages in inbound open innovation. It involves collaborating with startups, companies, universities and research centres to co-develop technologies, exchange knowledge and accelerate the market readiness of solutions by offering specialised support, infrastructure and integration within its innovation ecosystem.

This trajectory is a key element in driving innovation and accelerating the arrival of new solutions on the market. Open innovation is a foundational organisational principle that connects the organisation with startups, large companies, universities and research centres, creating a collaborative environment for developing new technologies. These partnerships facilitate the exchange of knowledge and the joint development of products, particularly in the healthcare sector where the regulatory complexity requires a variety of competencies and advanced infrastructure. The organisation's startup incubator plays a central role in this ecosystem, providing support to entrepreneurs and facilitating connections between academia, the private sector and the hospital. As Incubator Innovation Analyst 16 states, '*We take the startup and expand it, increase its potential, increase its impact, whether social or economic, or even if it's just an idea to create the product. So that's our main goal, and it ends up being our main support*.' Intellectual Property Manager 1 adds: '*A good example is the company called XPTO [name hidden]. It was a startup that was part of the organisation's ecosystem. Today, it's an organisational investment. It's still a startup, but a very successful one that has been on the market for a long time. I like that example because, besides being a successful startup that was born in our ecosystem, it was developed here, and it's still a partner of the organisation*.' All

of this strengthens the organisation's external innovation ecosystem and enables the development of innovative ideas in a real-world environment.

The organization's innovation ecosystem encompasses both internal and external innovation trajectories. The internal trajectory relies on outbound open innovation and a culture of innovation to ensure that research developed internally finds effective pathways for practical application. The external trajectory relies on inbound open innovation to capture external innovations and generate market-driven proposals.

5 Discussion

From a research and knowledge ecosystem perspective, entrepreneurship and innovation facilitate the connection and exchange of information and experiences. Most importantly, they facilitate the exchange of internal and external project trajectories for business creation. Figure 2 illustrates the transition and evolution trajectories of these elements within the knowledge and research ecosystem, as well as entrepreneurship and innovation within an ecosystem-orchestrating organisation. The framework shows that knowledge flow and actor mobility are important for creating value.

This study reveals that innovation trajectories predominantly move from knowledge and research ecosystems to entrepreneurship ecosystems, and then to innovation ecosystems. However, feedback loops are permitted between these stages. This directional progression reflects the organisation's structured innovation journey, as identified in the empirical analysis.

More specifically, the empirical evidence shows that actor mobility is a structurally enabled process within the orchestrated ecosystem, not an incidental phenomenon. Mobility occurs through formalised mechanisms such as intellectual property governance, venture-building programmes, validation infrastructures and incubation processes. These mechanisms facilitate the movement of projects and individuals across ecosystem layers. They actively shape knowledge flows, transforming scientific outputs into entrepreneurial initiatives and subsequently into market-oriented innovations. This reinforces the resource orchestration perspective, in which structuring, bundling and leveraging capabilities are central to ecosystem coordination (Sirmon et al., 2011; Helfat et al., 2007).

The internal innovation trajectory is a structured flow through which knowledge is transformed into internal entrepreneurship projects and applied innovation. This process is driven by institutional mechanisms such as specialised infrastructure, innovation programmes and a culture of intrapreneurship that support and ensure the viability of research. The transition involves IP management, technology

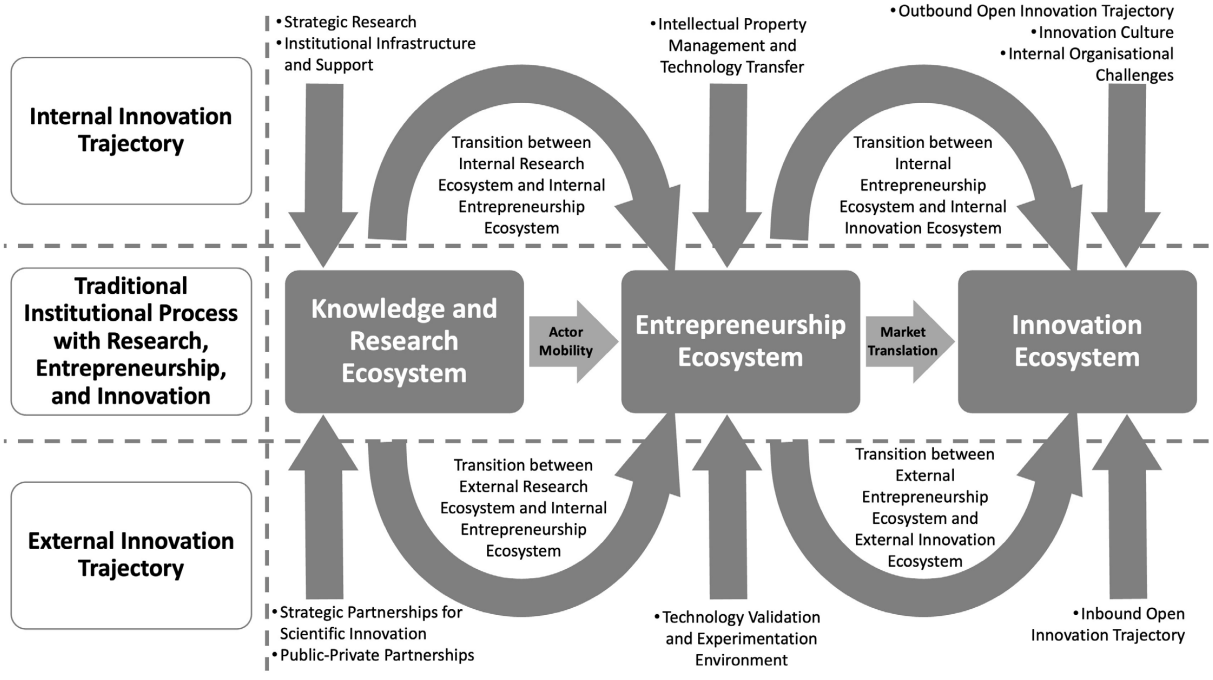

Figure 2. Innovation Trajectories.
Source: Research Data.

transfer and project incubation, which enables scientific discoveries to be protected, validated and developed into products or services. The internal ecosystem also serves as an environment for experimentation, testing ideas before market launch to ensure they align with strategy and sector demands. This process reduces uncertainties in the innovation process, ensures the scalability of solutions and strengthens the organisation's role as an innovation catalyst.

The external innovation trajectory occurs when the orchestrating organisation collaborates with startups, universities, research centres and large companies to capture, develop and validate new solutions. Structured within open innovation, this process integrates external knowledge into the organisational ecosystem ('inbound') or releases internal technologies to the market ('outbound'). This is achieved through strategic partnerships, startup incubation and acceleration, co-development, and real-world technological validation. External projects may be integrated into the internal trajectory to leverage its expertise for optimal results. This external flow broadens innovative capabilities, strengthens innovation leadership and improves collaboration with market players to refine and test technologies. Thus, integrating both trajectories demonstrates how the organisation acts as an innovation hub, connecting knowledge, entrepreneurship and the market to accelerate the development of solutions.

The transition between knowledge, entrepreneurship and innovation ecosystems is crucial for the commercialisation of new technologies and for ensuring that scientific discoveries have an impact on the market. This echoes the need to bridge the gap between knowledge and business ecosystems (Clarysse et al., 2014). Our findings emphasise the importance of mobility between ecosystems for researchers and entrepreneurs to facilitate this transition. Figure 2 illustrates how this mobility emerges through IP protection, technological validation and support for innovative businesses. This mitigates the uncertainties associated with science and technology-based entrepreneurship (deeptech), where lengthy development cycles, reliance on advanced research and the need for regulatory validation make coordinating ecosystems more challenging than in general innovation contexts. This allows the orchestrating organisation to act as a bridge between academia and the market for new solutions.

This finding reinforces the idea that ecosystem transitions are coordinated shifts across ecosystem typologies, where orchestration mechanisms actively reduce uncertainty and align heterogeneous actors around shared innovation goals (Adner, 2017; Scaringella & Radziwon, 2018). Unlike the loosely coupled ecosystems described in previous studies, this case study demonstrates an integrated orchestration model in which internal coordination replaces market-based alignment, intensifying the interdependencies between research, entrepreneurship and innovation environments.

This mobility not only represents a structural movement across organisational domains, but also implies a transformation in the roles and decision-making processes of those involved. As researchers transition from the knowledge ecosystem to entrepreneurship and innovation environments, their activities gradually shift from scientific problem-solving and knowledge production to opportunity identification, IP development, business model design and market validation. In this process, knowledge is transferred, reinterpreted and strategically reframed to meet criteria of technological feasibility, regulatory compliance and commercial viability. Therefore, inter-ecosystem transitions involve both knowledge flows and cognitive shifts as actors adapt to new evaluation mechanisms, risk perceptions and performance expectations. In deeptech contexts, this transformation is particularly pronounced given the high level of technological uncertainty and the requirement for coordinated validation infrastructures. This reinforces the central role of orchestration in aligning scientific exploration with market-oriented execution.

The framework highlights how the organisation balances inbound and outbound trajectories, enabling internal and external initiatives to drive ecosystem evolution. This balance aligns research, entrepreneurship and innovation, thus sustaining the ecosystem over time. The framework illustrates how transitions are managed, emphasising the role of large companies in fostering open and collaborative innovation. The link between the framework and the study underscores the importance of structuring integrated ecosystems to optimise the transition between research, entrepreneurship and innovation, thereby generating significant market and societal impact.

The findings emphasise the role of the orchestrating organisation in transitioning between knowledge, entrepreneurship and innovation ecosystems. This supports the existing literature on the mobility of the actors generating value (Järvi et al., 2018; Miller et al., 2016). The study shows that the organisation acts as a

link between knowledge production and the creation of market value, enabling innovations developed internally to be structured and validated before their commercial launch. It fosters startup development and strengthens interaction between academia and industry, thereby expanding technology transfer opportunities.

Compared to established models of ecosystem orchestration (Dhanaraj & Parkhe, 2006; Harima et al., 2024; Tabas et al., 2023; Reypens et al., 2021; Paquin & Howard-Grenville, 2013), the observed practices both align with and extend prior typologies. Similar to hub firms described in the literature, the focal organisation mobilises resources, aligns complementarities and coordinates interdependencies. However, unlike many regional or platform-based ecosystems, orchestration occurs within an internally structured ecosystem configuration here, where the focal firm intentionally integrates multiple ecosystem layers under a unified strategic architecture. This suggests an extension of orchestration theory towards internal ecosystem governance in science-based contexts.

This aligns with the perspectives on entrepreneurship of Foss and Klein (2012), as the organisation plays a central role in driving promising innovations. These strategies enable new ventures to emerge from scientific research and be tested in a controlled environment, thereby fostering scalable solutions that meet market needs. The organisation's role as an innovation catalyst through venture building and open innovation reinforces the idea that established companies can actively convert knowledge into market opportunities (Ritala et al., 2013).

The research shows that the organisation has built an integrated ecosystem that links research, entrepreneurship and innovation within a single business model. The empirical evidence suggests that the observed orchestration mechanisms are particularly well-suited to deeptech innovation as they address specific challenges such as technological complexity, high upfront investment, long maturation periods and strong dependence on scientific validation. While some of these mechanisms may be applicable to innovation ecosystems more broadly, their configuration in this case reflects the specific requirements of science-based and deeptech ventures. However, the case also demonstrates that these mechanisms extend beyond deeptech contexts, as the organisation simultaneously coordinates other knowledge-intensive healthcare innovation initiatives within the same hybrid ecosystem architecture. This is consistent with literature on deeptechs and science-based innovation, which emphasises the importance of a vibrant research environment for transitioning from science to market (Khanna, 2022; Marinelli et al., 2023).

From a typological perspective (Scaringella & Radziwon, 2018), the case study demonstrates a tightly coupled interaction between knowledge, entrepreneurship and innovation ecosystems, rather than the loosely connected forms often described in previous studies. Although the existing literature frequently conceptualises these ecosystems as analytically distinct, the empirical evidence suggests that functional integration under a single orchestrator can accelerate inter-ecosystem transitions and stabilise long-term innovation trajectories, particularly in deeptech environments. The findings demonstrate that the organisation's strategy is based on the integration of academia and industry, which is a critical factor for innovation. Adopting co-development and technology transfer models shows that large organisations can create ecosystems that accelerate the validation and scalability of new products and services (Herzog et al., 2024). This underscores the importance of further studies on ecosystem evolution and actor co-evolution (Gomes et al., 2024).

Analysing internal and external ecosystems reveals that the organisation adopts mechanisms to foster innovation, in line with literature on knowledge ecosystem dynamics (Valkokari, 2015). The organisation's research, entrepreneurship and innovation ecosystems highlight the importance of integrating internal and external environments. Structuring these trajectories confirms that academic and business ecosystems are increasingly interconnected, thereby promoting greater knowledge circulation (Rådberg & Löfsten, 2023). The results reinforce the idea that the success of entrepreneurship ecosystems depends on robust support for experimentation and business model development. The structured innovation framework transforms research into applicable solutions, contributing to advancements in healthcare and technology. The research deepens our understanding of how a focal organisation orchestrates multiple ecosystems and drives innovation, offering new insights into business models that integrate with research and entrepreneurship.

5.1 Contributions to the literature

This paper makes a significant contribution to the literature on the mobility of actors within knowledge, entrepreneurship and innovation ecosystems. It improves our understanding of how entrepreneurs and researchers move between these ecosystems, transforming knowledge

into applied innovation (Järvi et al., 2018; Miller et al., 2016). Furthermore, it highlights the importance of entrepreneurship (Foss & Klein, 2012) as a concept that explores strategic decision-making in uncertain situations and its impact on the formation of new science- and technology-based businesses. The study examines how established companies and startups can make this judgement to maximise value creation and reduce the risks associated with technology-based innovation. More specifically, the study contributes to the literature on deeptech and science-based innovation by demonstrating how ecosystem orchestration mechanisms differ when innovation trajectories originate in advanced research environments. While deeptech initiatives are a central empirical dimension of the case study, the findings also extend to broader knowledge-intensive healthcare innovations, reflecting the hybrid innovation configuration of the organisation under study. Unlike ecosystems centred on digital or market-driven innovation, deeptech ecosystems require stronger integration between research infrastructure, intellectual property governance, validation environments and commercialisation mechanisms.

Another contribution is the analysis of transitions between ecosystems within orchestrating organisations, a topic that is still underexplored in the literature (Harima et al., 2024; Tabas et al., 2023; Autio & Thomas, 2022). The study demonstrates that leading companies within ecosystems can facilitate the commercialisation of innovations by acting as intermediaries between academic research and industry (Harima et al., 2024; Tabas et al., 2023; Dhanaraj & Parkhe, 2006). This reinforces the role of universities and research centres in developing deeptechs and facilitating the transfer of knowledge to the market (Khanna, 2022; Marinelli et al., 2023).

Finally, the research highlights the evolution of ecosystems and the co-evolution of the involved actors, which aligns with recent studies on ecosystem dynamics (Silva & Grützmann, 2023). The interconnection between knowledge, entrepreneurship and innovation ecosystems is essential for ensuring the long-term sustainability of innovation. By integrating different perspectives on the transition between ecosystems, the paper broadens our understanding of value creation and the challenges of innovation within orchestrating organisations.

5.2 Contributions to practice and management

The main managerial contributions of the study concern how orchestrating organisations can design innovation ecosystems to optimise the transition from research to entrepreneurship and the market. Structured open innovation models, such as venture building, reduce uncertainty and accelerate the conversion of scientific knowledge into scalable, market-ready solutions. It is equally important to foster an environment that supports intrapreneurs by providing them with resources, mentoring and strategic decision-making tools. This minimises innovation risks and creates a consistent pipeline for new business development.

For organisations operating in deeptech contexts, the findings highlight the importance of establishing structured validation environments, robust IP strategies and long-term investment mechanisms capable of sustaining extended development cycles. Managers in science-based sectors must recognise that orchestrating ecosystems in deeptech requires greater coordination and stronger institutional alignment than in settings involving incremental innovation.

Another key contribution is the integration of academia, startups and large companies within a single ecosystem. Effective mechanisms such as IP policies, experimentation with new solutions, strategic partnerships and collaborative networks facilitate value co-creation and technology transfer, thereby strengthening science-based innovation. By offering guidelines for managing complex ecosystems, the study advances strategies that enhance the impact and sustainability of innovations, ensuring they are effectively adopted and remain competitive in dynamic markets.

6 Conclusions

The objective of this study was to examine the innovation trajectories adopted by a leading organisation and ecosystem orchestrator in order to structure and enable future innovations. The study therefore presented an in-depth analysis of the transition between research, entrepreneurship and innovation within an ecosystem-orchestrating organisation, highlighting how these environments interconnect to drive the development of research-based knowledge into market-oriented innovations. It emphasises that an organisation's ability to act as an orchestrator is directly linked to its capacity to create synergies between ecosystem actors and facilitate entrepreneurs' trajectories.

The findings confirm that ecosystem orchestration facilitates actor mobility and reshapes the conditions under which projects evolve across research, entrepreneurship and innovation environments (Järvi et al., 2018). The hybrid

configuration of the organisation enables similar orchestration mechanisms to support broader, knowledge-intensive healthcare innovations, including clinical, technological and operational initiatives that extend beyond strictly deeptech domains. While this configuration is particularly suited to science-based and deeptech contexts, the findings also apply to broader knowledge-intensive innovation settings due to the organisation's hybrid nature.

The study shows that orchestration reduces uncertainty in the innovation process and ensures the scalability of developed technologies. The results show that structured inbound and outbound open innovation practices enable companies to optimise the flow of knowledge and create a more dynamic environment for technology development (Autio & Thomas, 2022; Ritala et al., 2013). Overall, the key contribution lies in conceptualising innovation trajectories as ecosystem-mediated organisational pathways shaped by orchestration, rather than purely technological or industry-determined processes.

Figure 2 illustrates the transition between knowledge and research, entrepreneurship and innovation ecosystems, and highlights internal and external innovation trajectories within an orchestrating organisation. The internal trajectory involves strategic research and entrepreneurial projects, which are supported by infrastructure, IP protection and validation mechanisms until marketable innovations are reached. The external trajectory involves collaboration with startups, universities, research centres and partner companies to enable the joint development of new technologies through inbound and outbound open innovation. This framework emphasises that efficient management of transitions between ecosystems and actor mobility are essential for structuring and enabling future innovations, thereby strengthening the organisation's role as an innovation hub and driving impact in both the market and society.

6.1 Limitations and future agenda

Despite its theoretical and managerial contributions, this study has some limitations. First, the research is based on a single case study, which may restrict the generalisability of the findings to other organisations or sectors. Second, as the analysis focused on an organisation in the healthcare sector, which has specific regulatory and institutional characteristics, the applicability of the findings to other industries may be restricted. Therefore, comparative studies across different sectors could improve our understanding of how transitions between research, entrepreneurship and innovation occur in various contexts, and could help to identify common patterns. Another limitation is the temporal perspective of the study, as the transition between ecosystems unfolds over time and may involve strategic changes that were not fully captured in this study. Longitudinal studies could provide a more detailed view of ecosystem evolution and organisational adaptation to different innovation contexts. Future research could also explore differences in internal ecosystem orchestration between deeptech ventures and other innovation contexts. It could also examine actor mobility and inter-ecosystem transitions using multi-case designs. Such studies would refine the conceptualisation of innovation trajectories and ecosystem orchestration within established organisations.

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The authors declare that artificial intelligence (AI) platforms were utilized in various stages of this research to enhance accuracy, efficiency, and overall quality. The specific contributions of AI to this work include:
(X) Enhancing readability and proofreading – *ChatGPT*
(X) Others: Translation – *ChatGPT, DeepL, Grammarly*
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2nd author: Development of hypotheses or research questions (empirical studies); definition of methodological procedures; literature review; analysis and interpretation of data; critical revision of the manuscript.