Ph. D. Programme in Human, Movement and Sport Sciences

XXXVIII Cycle

Coordinator: Professor Maria Francesca Piacentini

Open Innovation Strategies in European Sport: How Start-ups collaborate within Open Innovation Ecosystems

Scientific Disciplinary Sector SECS-P/08

Ph.D. Student:

Daniele Canini

Supervisor:

Professor Francesca Vicentini

Co-supervisor:

Professor Anne Tjønndal

Academic years 2022/2025

Table of Contents

English abstract

Innovation in European sport is increasingly taking place through open, collaborative networks where start-ups, institutions, large companies, user communities, investors and technology providers contribute to defining solutions, knowledge and new organisational models. With this development, start-ups are becoming key actors in shaping sport innovations. From this starting point, my thesis examines how European sports start-ups collaborate with actors in the Open Innovation Ecosystem (OIE) and what Open Innovation (OI) strategies characterise these collaborative relationships. The research combines a cultural perspective on innovation in sport, a scoping review that develops a sport-specific conceptual model of OIE, a qualitative study based on interviews with executives from Italian start-ups, and a quantitative survey of the openness configurations adopted by over two hundred European sports start-ups. The findings show that innovation in the European sports sector is deeply influenced by the cultural values, institutional logics and participatory practises that characterise the sector. Outside-in and coupled OI strategies are the most widespread amongst European sports start-ups. The conceptual model shows that sports OIE are ecosystem characterised by a different level of formalisation compared to other sectors. Specifically, users play a central role while intermediaries, universities and knowledge brokers hold marginal influence. Empirically, start-ups balance experimentation and consolidation phases to manage their limited resources with building legitimacy and adapt to contextual conditions. The strategic configurations identified in the quantitative chapter show differentiated trajectories of openness, influenced by organisational constraints and characteristics of the actors involved. My thesis contributes theoretically to the advancement of OI and OIE applied to sport and offers managerial and practical implications for ecosystem actors. At the managerial level, the results suggest the need to structure clearer coordination mechanisms, reduce the bureaucratic

rigidity of procedures and create regulated spaces for experimentation capable of supporting start-ups in innovation processes. From a practical point of view, the findings highlight that systematic user involvement and differentiated collaboration strategies can increase start-ups' ability to validate their solutions and strengthen their position in the ecosystem. The final reflections identify new directions for research related to start-ups' performance, cultural differences and the development of more effective intermediation infrastructures.

Italian abstract

L'innovazione nello sport europeo sta avvenendo sempre più attraverso reti aperte e collaborative dove start-up, istituzioni, grandi aziende, comunità di utenti, investitori e fornitori di tecnologia contribuiscono a definire soluzioni, conoscenze e nuovi modelli organizzativi. Con questo sviluppo, le start-up stanno diventando attori chiave nel dar forma alle innovazioni sportive. Partendo da questo presupposto, la mia tesi esamina come le start-up sportive europee collaborano con gli attori dell'Open Innovation Ecosystem (OIE) e quali strategie di Open Innovation (OI) caratterizzano queste relazioni collaborative. La ricerca combina una prospettiva culturale sull'innovazione nello sport, una scoping review che sviluppa il modello concettuale dell'OIE specifico per lo sport, uno studio qualitativo basato su interviste con dirigenti di start-up italiane e un'indagine quantitativa sulle configurazioni di apertura adottate da oltre duecento start-up sportive europee. I risultati mostrano che l'innovazione nel settore sportivo europeo è profondamente influenzata dai valori culturali, dalle logiche istituzionali e dalle pratiche partecipative che caratterizzano il settore. Le strategie Outside-in e Coupled sono le più diffuse tra le start-up sportive europee. Il modello concettuale mostra che l'OIE nello sport è un ecosistema caratterizzato da un livello di formalizzazione diverso rispetto ad altri settori. In particolare, gli utenti hanno un ruolo centrale, mentre gli intermediari, le università e i mediatori di conoscenza hanno un'influenza marginale. A livello empirico, le start-up bilanciano le fasi di sperimentazione e consolidamento per gestire le loro risorse limitate, costruire legittimità e adattarsi alle condizioni contestuali. Le configurazioni strategiche identificate nel capitolo quantitativo mostrano traiettorie differenziate di apertura, influenzate dai vincoli organizzativi e dalle caratteristiche degli attori coinvolti. La mia tesi contribuisce a livello teorico al progresso dell'OI e dell'OIE applicate allo sport e offre implicazioni manageriali e pratiche per gli attori dell'ecosistema. A livello

manageriale, i risultati suggeriscono la necessità di strutturare meccanismi di coordinamento più chiari, ridurre la rigidità burocratica delle procedure e creare spazi regolamentati per la sperimentazione in grado di supportare le start-up nei processi di innovazione. Da un punto di vista pratico, i risultati evidenziano che il coinvolgimento sistematico degli utenti e strategie di collaborazione differenziate possono aumentare la capacità delle start-up di convalidare le loro soluzioni e rafforzare la loro posizione nell'ecosistema. Le riflessioni finali identificano nuove direzioni per la ricerca relativa alle performance delle start-up, alle differenze culturali e allo sviluppo di infrastrutture di intermediazione più efficaci.

List of abbreviations

Open Innovation (OI)

Open Innovation Ecosystem (OIE)

Research and Development (R&D)

Small and Medium-sized Enterprises (SMEs)

Collective Qualitative Analysis (CQA)

Principal Component Analysis (PCA)

General Data Protection Regulation (GDPR)

List of tables

List of figures

1. Introduction

This chapter introduces the background for the study, outlining current transformations that characterise the European sports sector and how these changes are impacting sports innovation processes. It also identifies the main gaps in literature, presents the research question and aims and describes the structure of the thesis.

1.1 Innovation, sport and collaboration: the starting point

The European sports sector is undergoing rapid and significant changes. Digital transformations, a growing convergence of sport, media and entertainment, and an increasing focus on sustainability are currently reshaping roles, skills, and organisational models in sport (Corthouts *et al*., 2021; Hammerschmidt *et al*., 2024; Hoff & Leopkey, 2025). In today's European sport landscape, innovation has become a central driver of change, enabling organisations to adapt to new social, economic and technological demands. However, the way innovation is developed and managed is also evolving. From a focus on internal control typical of "closed" innovation models, the European sports sector is moving towards Open Innovation (OI) approaches based on collaboration, circulation of ideas and the intentional management of knowledge flows beyond organisational boundaries (Chesbrough, 2003; Gassmann & Enkel, 2004; Randhawa *et al*., 2020). This transition is visible through multiple examples. For instance, in cycling by the development of Zwift, a digital platform that involves athletes, developers and global communities in the co-creation of virtual sporting experiences (Zwift, n.d.), or in football through the *Barça Innovation Hub*, which promotes collaboration between clubs, universities and start-ups to encourage applied research and technological innovation (FC Barcelona, n.d.). In sporting contexts such as these examples, start-ups are playing an increasingly central role in sports innovation processes.

Defined as temporary companies with the aim of developing scalable business models (Blank, 2010), start-ups are characterized by a lean organisational structure and limited resources. Their ability to develop new technologies, services and business models that connect traditionally distant actors and fields, positions them as catalysts for openness and collaboration (Spender *et al*., 2017; Marullo *et al*., 2018; Audretsch *et al*., 2023; Gerke *et al*., 2025). Acting as bridge organisations, start-ups may connect sport sector with that of technology, media and digital, bringing new skills and innovative practices that challenge traditional institutional logic.

Despite growing interest in innovation in the sport sector (Tjønndal, 2017), most research has focused on internal organisational aspects (Hoeber *et al*., 2015) or specific technologies (Corthouts *et al*., 2023; Hammerschmidt *et al*., 2024). While these studies have yielded important knowledge of how sports organisations design their structures, manage change and implement technological solutions, there is limited research into the relational and collaborative dimension that characterises Open Innovation processes in sport. In other words, as innovation processes in European sport are transitioning from closed to open approaches, there is a need to examine how different actors interact, exchange knowledge and build partnerships that support innovation.

In the field of sport management, the concept of Open Innovation received limited attention. Specifically, there is limited research on the collaboration between actors and the structure of the ecosystems that connect them (Delshab *et al*., 2022; Knaus & Merkle, 2020; Mondalizadeh *et al*., 2024; Wemmer *et al*., 2016). Understanding these dynamics is crucial, as the sports sector's capacity for innovation increasingly depends on interaction between heterogeneous actors who share resources, knowledge and objectives in complex organisational contexts. Even in the literature on Open Innovation Ecosystems (OIEs), the sports sector has remained marginal. Current Open Innovation research has focused on the manufacturing of medical implants

(Randhawa *et al*., 2020), the production of electric cars and supporting infrastructure (Meenakshisundaram & Shankar, 2009), and cultural industries (Dianova *et al*., 2023). However, there is a lack of research applying the ecosystem model to the specificities of sport.

Applying the perspectives of OI and OIE in the field of sport management is essential to ensure that the European sports sector remains competitive and socially relevant in a context of rapid technological and cultural change. Sports start-ups play an important role in this process, as they represent laboratories for collaboration and experimentation, in which new organisational and strategic models are developed. Understanding how they interact with other actors in the ecosystem is therefore crucial to strengthen sport's capacity to develop innovations.

1.2 Research question and aims

Based on the insights presented in section 1.1, an overarching research question for the thesis was developed. This research question is as follows: *How do European sport start-ups collaborate with actors in Open Innovation Ecosystems, and what strategies characterise these relationships?*

Starting from this question, the thesis is structured around four main aims: (1) to outline how culture and institutional contexts shape innovation in sport; (2) to examine the forms and structures through which Open Innovation takes shape in sport; (3) to analyse the role and experiences of start-ups as actors in the Open Innovation Ecosystem; and (4) to understand the configurations of openness and collaboration that characterize the relationships between sports start-ups and other actors.

To achieve these aims, my thesis adopts a mixed and sequential design (Plano Clark *et al*., 2008) that combines theoretical conceptualisation and empirical studies. Specifically, the analytical contribution of the thesis consists of a conceptual book chapter (Chapter 4, *The Impact of Culture on Sport Innovations*), a literature review (Chapter 5, *Open Innovation Ecosystems: A*

Scoping Review and Conceptual Model for Sport Management), a qualitative interview study (Chapter 6, *Underdogs in the Game: How Sports Start-ups Navigate Collaboration with External Actors*) and a quantitative survey study (Chapter 7, *Mapping Open Innovation Strategies among Sports Start-ups in Europe*).

The thesis is structured as follows: Chapter 2 presents the theoretical framework on innovation culture, Open Innovation and Open Innovation Ecosystems, exploration-exploitation and organisational learning; Chapter 3 outlines the research design, methodology and ethical considerations; Chapter 4-7 presents the original research contributions of the thesis. Chapter 4 reports the contribution of culture to innovation processes in sport; Chapter 5 includes the scoping review on OIE and the conceptual model; Chapter 6 presents the qualitative study with executives of Italian sports start-ups; Chapter 7 includes the quantitative study that maps the openness strategies of European sports start-ups; Chapter 8 integrates the results and provides a discussion on the findings across the conceptual and empirical contributions of the thesis. Chapter 9 discusses theoretical, managerial and practical implications, outlines future directions, and concludes with the overall contribution of the thesis. Finally, the reference list is provided.

2. Theoretical framework

In order to analyse how European sports start-ups collaborate with actors within OIEs and what strategies characterise these relationships, this chapter presents the theoretical framework that guide the thesis. The starting point is the cultural change that has transformed the way innovation is conceived: from a closed model focused on internal knowledge control, to open models based on collaboration and the circulation of ideas. On this basis, I introduce the paradigm of Open Innovation and the perspective of Open Innovation Ecosystems. I then integrate the theories of exploration-exploitation balance and organisational learning, with a focus on the implications for start-ups.

2.1 From closed to open: the culture of innovation

To understand how European sports start-ups collaborate with different actors within OIEs, it is necessary to clarify how theoretical understanding of innovation has evolved. Innovation is a complex and multidimensional phenomenon that has been studied in economics and management since the early decades of the 20th century (Godin, 2015). Schumpeter (1939) defined it as the driving force behind economic development and, while in his early works he attributed innovation to the initiative of the entrepreneurial genius, in his later works he recognised the importance of joint efforts and collaborations between individuals as essential components of innovative process (McCraw, 2007). With his theory of *creative destruction*, Schumpeter described progress as a process of continuous renewal, in which new combinations of resources replace previous ones. In the following years, Rogers (1962) explained innovation as a process of social diffusion, in which new ideas spread through communication networks and user groups. These contributions were

complemented by the vision of Freeman (1974) who interpreted innovation as an essential condition for industrial growth and business competitiveness.

Starting in the 1970s and 1980s, attention shifted to how companies organise and manage innovation processes. During this period, linear models emerged, which conceived innovation as an internal and planned sequence, from the idea to the market, with a central role for R&D (Kline & Rosenberg, 1986; Godin, 2006). Innovation was seen as a closed and controlled activity. Knowledge was considered a strategic resource to be protected, while external interactions appeared marginal (von Hippel, 1988).

In the 1990s, increasing globalisation, accelerating technological cycles and digitalisation challenged closed models, pushing companies to open and collaborative configurations (Freeman & Soete, 1997; Bogers & West, 2012). Von Hippel (1988) anticipated this transition, highlighting how the knowledge sources needed for innovation are often distributed among a plurality of actors, including users, suppliers and communities. This perspective was developed in subsequent years when, faced with increasingly complex markets, companies have understood that the ability to learn from outside and manage knowledge networks has become a fundamental condition for competing (Enkel *et al*., 2009; Gassmann & Enkel, 2004). This change has set the way for the emergence of the Open Innovation paradigm, which formalised the overcoming of traditional organisational boundaries and introduced a vision of innovation as an intentionally open and distribute process (Chesbrough, 2003; Chesbrough & Bogers, 2014).

This transition marked a transformation to a new understanding of how knowledge and innovation are managed. From an internal, linear activity, innovation is now understood as a dynamic process based on collaboration and the sharing of ideas between multiple actors. As Baregheh *et al*. (2009) point out, innovation can be interpreted as a multi-stage process that

transforms ideas into new or improved products, services or processes, enabling organisations to evolve, compete and differentiate themselves. Innovation is therefore not an exclusively internal process, but a phenomenon involving a network of heterogeneous actors. Thus, value creation derives from interaction and mutual trust, and the ability to connect external resources and skills becomes a crucial factor for long-term competitiveness and sustainability. From this understanding of innovation, start-ups play a significant role, as their agile and experimentation-oriented structure facilitates connections with external resources, the activation of collaborative networks and the transformation of knowledge into innovative solutions.

The sport sector is also aligning itself with the shift from closed to open models of innovation (Hammerschmidt *et al*., 2024; Delshab *et al*., 2022). Specifically, the spread of digital platforms and experimentation-oriented start-ups are expanding traditional boundaries of sport innovation fostering collaborative networks in which clubs, federations, companies and users co-participate in value creation (Hoeber *et al*., 2015; Delshab *et al*., 2022). In this context, a culture of Open Innovation based on trust, transparency, and sharing is developing, replacing proprietary logic with a collaborative logic with co-creation practices.

2.2 Open Innovation and Open Innovation Ecosystems

In the early 2000s, Chesbrough introduced an alternative theoretical perspective that differs from theories of innovation as a closed and vertical practices within organisations. Chesbrough proposed a distributed conception of innovation processes, which he then defined as the Open Innovation paradigm (Chesbrough, 2006). As he states in his original work: "*valuable ideas can come from inside or outside the company and can go to market from inside or outside the company as well. This approach places external ideas and external paths to market on the same level of importance as that reserved for internal ideas and paths*" (Chesbrough, 2003, p. 43). In this first formulation,

OI is based on the idea that companies must integrate internal and external sources of knowledge in a complementary manner recognizing the equal value of ideas coming from outside.

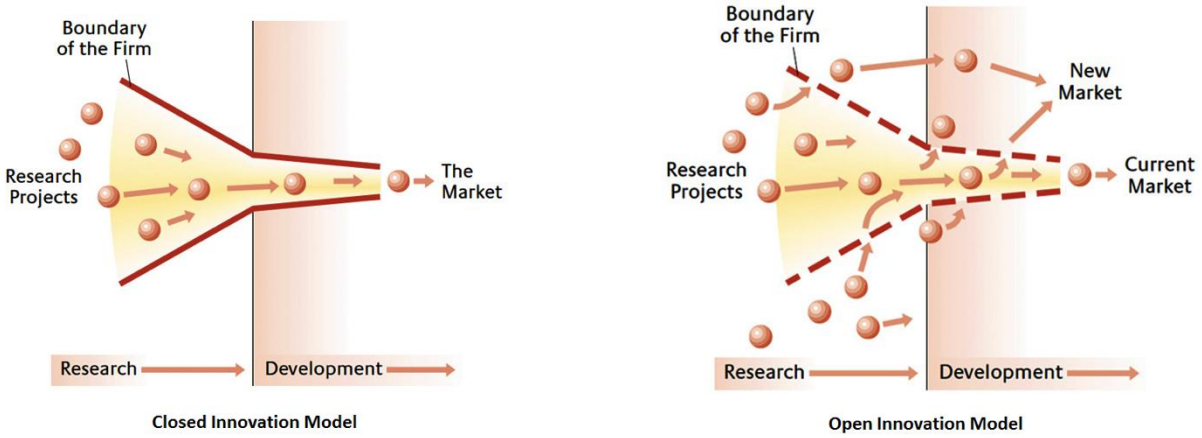


Figure 1. *The closed and open innovation model [source: (Chesbrough, 2003), p. 36-37].*

In 2006, Chesbrough expanded the definition by introducing the concept of intentionality: "*Open Innovation is the use of purposive inflows and outflows of knowledge to accelerate innovation and expand the markets for external use of innovation, respectively*" (Chesbrough, 2006, p. 1). The focus thus shifts from the simple acquisition or protection of knowledge to the intentional flows of knowledge (inbound and outbound) that companies manage to promote the speed and scope of their innovation processes. Building further on this, Chesbrough & Bogers (2014) integrated the dimension of business models into the definition, specifying that: "*Open Innovation is a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization's business model*" (Chesbrough & Bogers, 2014, p. 17). This version, now widely used, defines OI as a distributed process based on the intentional management of knowledge flows across organisational boundaries, regulated by economic mechanisms (licenses, partnerships,

investments) and non-economic mechanisms (trust, reputation, credibility) that are consistent with the business models (Chesbrough, 2024; Dahlander & Gann, 2010).

The OI paradigm can therefore be understood as the opposite of the vertical and closed model. If the closed model was based on internal control of knowledge, OI favours its circulation and exploitation within a network (Chesbrough, 2024; Bogers *et al*., 2017). This new logic is reflected in the recognition of two fundamental flows of knowledge: *inside-out* and *outside-in*, to which a third dimension, *coupled*, was subsequently added to describe processes of co-creation and bidirectional collaboration (Gassmann & Enkel, 2004). The taxonomy of openness strategies has been recently expanded to include *outside-out* and *inside-in* (Gutman *et al*., 2023; Randhawa *et al*., 2024a). The former refers to the exchange of knowledge between external entities without the direct involvement of the company. The latter represents more closed forms of internal learning.

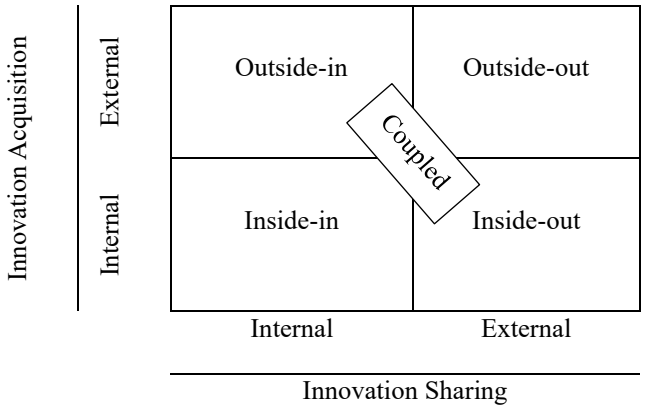


Figure 2. *Open Innovation strategies representation [source: Author's own elaboration].*

Taken together, these strategies describe the different ways in which organisations can engage external actors and manage knowledge flows within and beyond their boundaries. To analyse how these strategies play out in practice, Laursen & Salter (2006) introduced two analytical dimensions that capture the *breadth* and *depth* of openness. *Breadth* measures the number and variety of partners involved, while *depth* indicates the intensity and quality of exchanges of knowledge.

Recently, research has shown that the effectiveness of openness strategies may depend on the balance between these two dimensions (Greco *et al*., 2015; Love *et al*., 2014). Too much breadth can lead to dispersion and coordination difficulties, while too much depth can reduce exploratory capacity and limit access to new sources of knowledge (Dahlander *et al*., 2021; Bogers *et al*., 2017).

The theoretical evolution of OI has gradually shifted the focus from individual innovator to the system of relationships in which they operate. After more than twenty years of development, OI is now considered a theory of distributed knowledge flows (Chesbrough, 2024; Vanhaverbeke & Gilsing, 2024). It includes collaboration, crowdsourcing, open source, venture building and co-development of solutions within networks and ecosystems. This conceptual shift represents the point of contact between the OI paradigm and the perspective of Open Innovation Ecosystems.

The adoption of an ecosystemic perspective on OI has led to innovation being interpreted as a collective process in which value creation depends both on an organisation's internal resource and on how knowledge, skills and technologies are shared and used within collaborative networks. Open Innovation Ecosystems are therefore open relational spaces where companies, universities, public institutions, investors, intermediaries and communities co-create innovation through knowledge flows that cross organisational boundaries (Adner, 2016; Granstrand & Holgersson, 2020).

Despite growing attention, the concept of OIE remains relatively new and still being defined. While innovation ecosystems are positioned as "*an interdependent system of actors cooperating to create value that no single actor could generate independently*" (Bogers et al., 2019), OIE shift the focus on the dynamics of knowledge flows and the intentionality of collaborative processes (Thomas & Ritala, 2025; Vanhaverbeke & Gilsing, 2024). Thomas &

Ritala (2025) recently define them as "*a community of heterogeneous, hierarchically independent but interdependent actors who facilitate innovation through cross-boundary knowledge flows*" (p. 3), highlighting two key aspects: the diversity of actors involved and the distributed nature of learning.

Within OIE, actors can take on different roles, influencing the structure and evolution of the system. Some act as orchestrators, coordinating the network, defining common visions and facilitating strategic alignment among participants (Vanhaverbeke & Gilsing, 2024). Others act directly by promoting innovation and the transfer and translation of knowledge between different domains (Sieg *et al*., 2010; Hasche *et al*., 2016). Then there are actors who operate more indirectly, creating the enabling conditions for innovation and helping to maintain the coherence and sustainability of the ecosystem over time (Sieg *et al*., 2010; Hasche *et al*., 2016).

The dynamics governing OIE are based on a continuous balance between cooperation and competition, as actors share knowledge and resources while pursuing their own goals (Bez & Le Roy, 2024). Trust is a key enabling factor as it reduces uncertainty and supports the continuity of relationships (Blomqvist *et al*., 2024). Legitimacy operates as a regulatory mechanism that ensures stability and mutual recognition, facilitating inclusion of new partners and the co-evolution of participants' capabilities (Thomas & Ritala, 2022). OIEs thus generate new knowledge that is transformed in tangible innovation as products, services or organisational solutions, reinforcing the idea of innovation as a relational and open process, oriented to the shared creation of value. In the sport sector, collaborations between federations, start-ups and universities are becoming increasingly common, allowing technical skills and specialised knowledge to be combined to develop products, services and technologies (Di Francesco & Ferraro, 2018; Hoeber *et al*., 2015; Delshab *et al*., 2022). Adopting the perspective of OIEs allows me to interpret these processes as

a systemic phenomenon where actors do not operate in isolation, but within a set of interdependent relationships that include institutions, companies, investors, intermediaries and, above all, users. This view helps to understand the coexistence of cooperative and competitive dynamics and the role of trust and legitimacy as necessary conditions for developing innovation (Shilbury *et al*., 2016; Randhawa *et al*., 2024b).

2.3 Exploration-Exploitation and Organisational Learning

The OI paradigm and the OIE perspective explain how innovation develops from the interaction between heterogeneous actors and from the ability of organisations to manage knowledge coming from outside. However, it is necessary to understand how organisations balance the experimentation of new solutions and the consolidation of existing skills. In this sense, two theoretical frameworks help explain the dynamics of learning and adaptation that support innovation: the exploration-exploitation and Organisational Learning theories.

The exploration-exploitation theory proposed by March (1991), interpreted the innovation behaviour of organisations as the results of a strategic trade-off between two orientations. *Exploration* involves the search for new knowledge, technologies or markets, while *exploitation* refers to the refinement and enhancement of existing resources and skills (March 1991; He & Wong, 2004). This balance, often referred to as ambidexterity, represents a tension in innovation processes as the two dimensions of exploration and exploitation require different orientations, timing and resources. An excessive emphasis on exploitation can lead to rigidity and reduce adaptability, while an excess in exploitation risks wasting resources and compromising organisational sustainability (Cao *et al*., 2009; Junni *et al*., 2013).

While these terms were originally developed to describe the dynamics of large companies (March, 1991; Tushman & O'Reilly, 1996), recent literature has highlighted how ambidexterity is

critical for young companies like start-ups (Khursheed & Mustafa 2021; Balboni *et al*., 2019; Müller *et al*., 2019). Start-ups must balance exploration and exploitation in order to expand their learning capabilities and accessing complementary resources (Spender *et al*., 2017; Usman & Vanhaverbeke, 2017). However, their emerging nature exposes them to conditions of structural vulnerability. This structural vulnerability can be described as *liability of newness* and *smallness*. That is, their young age and small organisational size mean limited resources, fragile legitimacy and difficulty in building trust with other actors in the ecosystem (Gimenez-Fernandez *et al*., 2020; Usman & Vanhaverbeke, 2017).

The logic of balance and adaptation is closely linked to the theory of organisational learning, which interprets innovation as a process of accumulation and transformation of knowledge over time. Levitt & March (1988) describe organisational learning as an adaptation mechanism based on experience. Accordingly, organisations observe the results of their actions, interpret them and draw lessons to guide future directions. Cohen & Levinthal (1990) expand this perspective by introducing the concept of absorptive capacity, the ability to recognise the value of external knowledge, assimilate it and apply it effectively. In OI contexts, this capacity becomes a fundamental skill, as knowledge is generated and renewed through interactions, exchanges and inter-organisational learning processes (Bogers *et al*., 2017; Chesbrough, 2024).

From an analytical point of view, the concept of organisational learning allows for analysis of how start-ups interpret, internalise and reorganise the knowledge acquired through external collaborations. In this perspective, learning is conceived as a dynamic process in which organisations develop legitimacy and adapt to the relational and institutional conditions of the ecosystem. Learning thus takes on a relational dimension as organisations do not learn in isolation,

but within collaborative networks where trust, transparency and legitimacy support knowledge sharing and the emergence of new solutions (Dahlander & Gann, 2010; Thomas & Ritala, 2025).

Together, the concept of ambidexterity and organisational learning offer an interpretative lens for analysing the dynamics of innovation in the sport sector. Actors operating in this context, and in particular start-ups, must manage the strategic tension between experimenting with new solutions and leveraging already acquired skills (He & Wong, 2004; Junni *et al*., 2013). This balance influences the ability to learn and adapt within collaborative ecosystems, in which networks of relationships with companies, institutions and users become spaces for knowledge exchange and legitimisation (Hasche *et al*., 2016; Hoeber *et al*., 2015; Delshab *et al*., 2022).

3. Methodology and research design

This chapter describes the methodological framework of the thesis. It presents the research design and the reference context and then summarises the approach adopted in the three studies. It illustrates the data collection process and analytical criteria used, with specific references to papers for operational details and, finally, it includes ethical and quality considerations.

3.1 Research design

The methodological structure of this thesis responds to the need to systematically analyse how European sports start-ups collaborate with other actors in the ecosystem to promote innovation. This aim requires observing the phenomenon from different, complementary perspectives, capable of integrating cultural, conceptual and empirical dimensions that determine its development.

In this regard, the methodological approach combines the cultural analysis proposed in the chapter dedicated to the culture of innovation (Chapter 4), the conceptual model developed through the scoping review (Chapter 5) and the empirical analysis conducted using the qualitative and quantitative data collected in the two following studies (Chapter 6 and Chapter 7). The aim is to map the configurations of openness and analyse the relational strategies that characterise the different modes of interactions with actors in the ecosystem. The approaches, methodologies, aims and contributions of each chapter are shown in Table 1. This structure allows the theoretical construction to be linked to empirical analysis. In particular, the results of the scoping review guided the construction of the interview outline and the structure of the survey.

Chapter	Approach and methodology	Main aims	Contributions to the research
Chapter 4 – *The Impact of Culture on Sport Innovations*	Theoretical and conceptual analysis based on interdisciplinary literature	Examine how cultural and institutional contexts influence innovation process in sport	Provides a conceptual framework for the thesis, linking cultural values to processes of openness and collaboration
Chapter 5 – *Open Innovation Ecosystems: A Scoping Review and Conceptual Model for Sport Management*	Scoping review (Arksey & O'Malley, 2005; PRISMA-SCR guidelines)	Outline the state-of-art of OIE research and develop a conceptual model of OIE applicable to the sports sector	Addresses the lack of sector-specific conceptual model for OIEs in sport
Chapter 6 – *Underdogs in the Game: How Sports Start-ups Navigate Collaboration with External Actors*	Qualitative study based on semi-structured interview with Italian sports start-ups	Explore the experiences, needs and collaboration mechanisms of sports start-ups within their ecosystems	Fills an empirical gap regarding how sports start-ups build legitimacy, trust and learning relationships
Chapter 7 – *Mapping Open Innovation Strategies among Sports Start-ups in Europe*	Quantitative study based on a survey of European sports start-ups. PCA and cluster analysis	Map configurations of openness and analyse how start-ups collaborate with different ecosystem actors	Provides large-scale empirical evidence to validate and extend the qualitative findings at the European level

Table 1. *Overview of the research design [source: Author's own elaboration].*

3.2 Context: European sports start-ups

Defining what is meant by a "sports start-up" is a complex task. The growing convergence between sport, technology, health, media and entertainment makes it difficult to identify clear sectoral boundaries. To ensure conceptual consistency and data comparability, I adopted the classification proposed by SportTechX (SportsTechX, 2024), one of the most reputable companies that provides data, insights and content on start-up and innovation ecosystems in the sports sector. This taxonomy has been verified and supplemented by comparison with the Dealroom[1] and Crunchbase[2] databases, which I used to check the operational status, location and consistency of the inclusion criteria for the selected companies. According to the model developed by SportTechX, sports start-ups can be divided into three main categories, each divided into subcategories that reflect the variety of business models and technological solutions present in the market. The division and characteristics of each category and subcategory are shown in Table 2.

[1] Dealroom is a global data platform that collects information on start-ups, scale-ups, venture capital activities and emerging sectors, providing up-to-date data on funding, growth metrics and the dynamics of entrepreneurial ecosystem. See: https://dealroom.co/

[2] Crunchbase is a global database specialising in collecting data on companies' profile, funding rounds, investors and market trends in the start-up ecosystem. See: https://www.crunchbase.com/home

Category	Description	Subcategory	Description
(1) For Athletes – Activity & Performance	Solutions for athletes, whether they are professionals, amateurs or simply enthusiasts	(1.1) For Activity – Hardware	Concerns physical devices used during sports activities (e.g., sensors, wearables or smart equipment)
		(1.2) For Activity – Software	Includes applications and digital platforms to support performance, based on data monitoring, feedback or training programs
		(1.3) Before/After Activity	Hardware or software tools designed to assist athletes in the preparation or recovery phase, such as technologies for injury prevention or rehabilitation
(2) For Executives – Management & Organisations	Solutions aimed at executives, sports organisations and industry operators	(2.1) Organisations & Venues	Platforms and technologies for managing facilities, events and international operations within sports organisations
		(2.2) Media & Sponsors	Digital solutions for managing relationships with the media, commercial partners and sponsors, as well as for enhancing sports rights and content
(3) For Fans – Fans & Content	Solutions dedicated to the public and the fan experience	(3.1) Content Platforms	Platforms that offer access to and sharing of multimedia content in video, audio, or text form, for both users and creators
		(3.2) Fan Experiences	Includes products and services designed to improve fan engagement and participation, both live and online
		(3.3) Fantasy Sport & Betting	Includes solutions for online gaming and betting related to real or virtual sporting events

***Table 2**. Classification of sports categories and their description [source: SportTechX (SportTechX, 2024)].*

This classification was chosen because it represents an established benchmark in the practice of sports innovation. Integration with data from Dealroom and Crunchbase made it possible to verify the operational validity of the companies, identify start-ups that are active within the European Union.

Sports start-ups are capable of translating innovation into tangible solutions that respond to the needs of athletes, fans and sport organisations. Operating in different segments of the sports economy, these start-ups reflect the hybrid nature of contemporary sport, which

lies between industry, culture, health and social policy (Gammelsæter, 2021; Lucassen & Bakker, 2016). In the following sub-sections, I present an overview of the main methodological approaches, data collection processes and analysis tools used in each article adopted in the three empirical studies included in the thesis.

3.3 Chapter 5 – Open Innovation Ecosystems: A Scoping Review and Conceptual Model for Sport Management

The first study uses a scoping review methodology (Arksey & O'Malley, 2005). The decision is motivated by the emerging and evolving nature of the concept of OIE in sport. This approach is suitable when the field is new, definitions are multiple, and there is a need to map key concepts and knowledge gaps, without the constraints of critical evaluation of study quality typical of a systematic review (Arksey & O'Malley, 2005).

The review follows the five-stage model proposed by Arksey & O'Malley (2005) and adopted the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Review (PRISMA-ScR) (Tricco *et al*., 2018). The search string used ("Open Innovation Ecosystem*") was applied to the main international databases (ScienceDirect, Scopus and Web of Science) to identify studies that explicitly use the OIE concept. After removing duplicates and selecting based on inclusion criteria, the final corpus consisted of 41 contributions (see Figure 1, Chapter 5, p. 67).

Data extraction was carried out organising the contributions along four analytical dimensions: (1) definitions and conceptualisations of OIE, (2) actors and their roles in OIE, (3) relational structures, dynamics and strategies, and (4) implications for sport management. Content analysis of the results made it possible to develop the conceptual model applicable to the context of sport (see Figure 2, Chapter 5, p. 82) and for the categorisation of strategies and actors (see Table 4, Chapter 5, p. 77). The latter represents the theoretical basis for the

subsequent empirical phases of the research, guiding the construction of the interview guide used in the qualitative paper and the actor-strategy matrix used in the quantitative paper.

3.4 Chapter 6 – Underdogs in the game: How sports start-ups navigate collaboration with external actors

The second study adopts a qualitative approach to analyse how sports start-ups interpret and integrate OI strategies into their collaboration processes with ecosystem actors. The aim is to understand the logic behind the adoption of different openness strategies, the criteria for selecting key actors and the main difficulties encountered in the sports context.

The semi-structured interviews were conducted between May and August 2025 with 15 executives of Italian start-ups, selected among those who had completed the quantitative survey (Chapter 7) and expressed the willingness to participate in a further in-depth study. Each interview lasted an average of about 40 minutes and was conducted online via Microsoft Teams. All interviews were recorded, transcribed and translated into English to allow for a later analysis shared with the research team. The interview guide was divided in different thematic sections. After a brief introduction dedicated to the role of the interviewee and mission and vision of the start-ups, the conversation focused on the four OI strategies to analyse the logic behind their adoption (for instance: *"Which of the four Open Innovation strategy is most critical for your start-up today, and why?"*, or *"In your experience, which Open Innovation strategies are particularly important for start-ups in the sports sector, and what makes them so?"*). Then, the interview moved into the balance between breadth and depth and the criteria for selecting and involving the main actors in the ecosystem (for instance: *"Could you describe a particularly successful/unsuccessful collaboration with one of these actors?*). In the next part, the interviewee was asked to reflect on the barrier and obstacles encountered in the sports sector (for instance: *"What are the main obstacles you have encountered in adopting Open Innovation practices with these actors? How have you worked to overcome these barriers?"*, or *"What*

sector-specific barriers, if any, have you encountered when implementing Open Innovation strategies in your sports-related start-up?"). In closing, they were asked to express an estimation of the prospects for the evolution of their company over the next two or three years, and finally to offer advice to those who intend to develop a sports start-up and collaborate with other players in the OIE.

Data analysis was conducted using the Collective Qualitative Analysis (CQA) approach proposed by Eggebø (2020), which values reflective and iterative discussion among researchers as an integral part of the analytical process. In the first phase, each researcher read the interviews in their entity and wrote their own personal abstract (maximum one and a half page), noting reflections and recurring concepts. Then, the research group read each other's abstract promoting a shared understanding of the material collected. For each interview, a summary sheet was then drawn up (Figure 3), incorporating observations from the various memos.

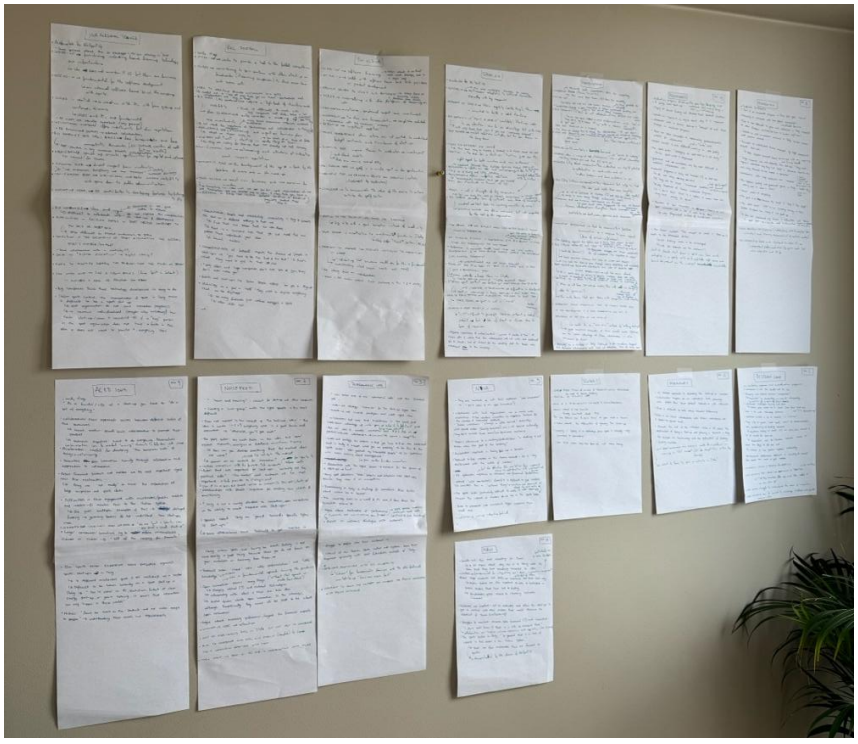


Figure 3*. Summary sheets for each interview with researchers' notes.*

Based on these materials, a thematic summary sheet (Figure 4) was drawn up, bringing together the main recurring topics and their connections.

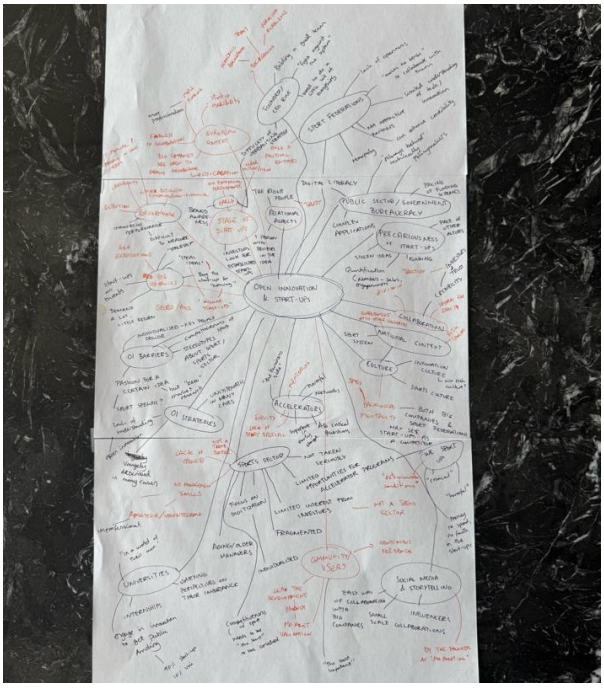


Figure 4. *Thematic summary sheet with the main areas and their connections.*

For each macro-theme identified, a dedicated sheet (Figure 5) was then prepared, in which researchers included textual references to the interviews, also indicating cases of multiple citations and the most representative interviews for each theme.

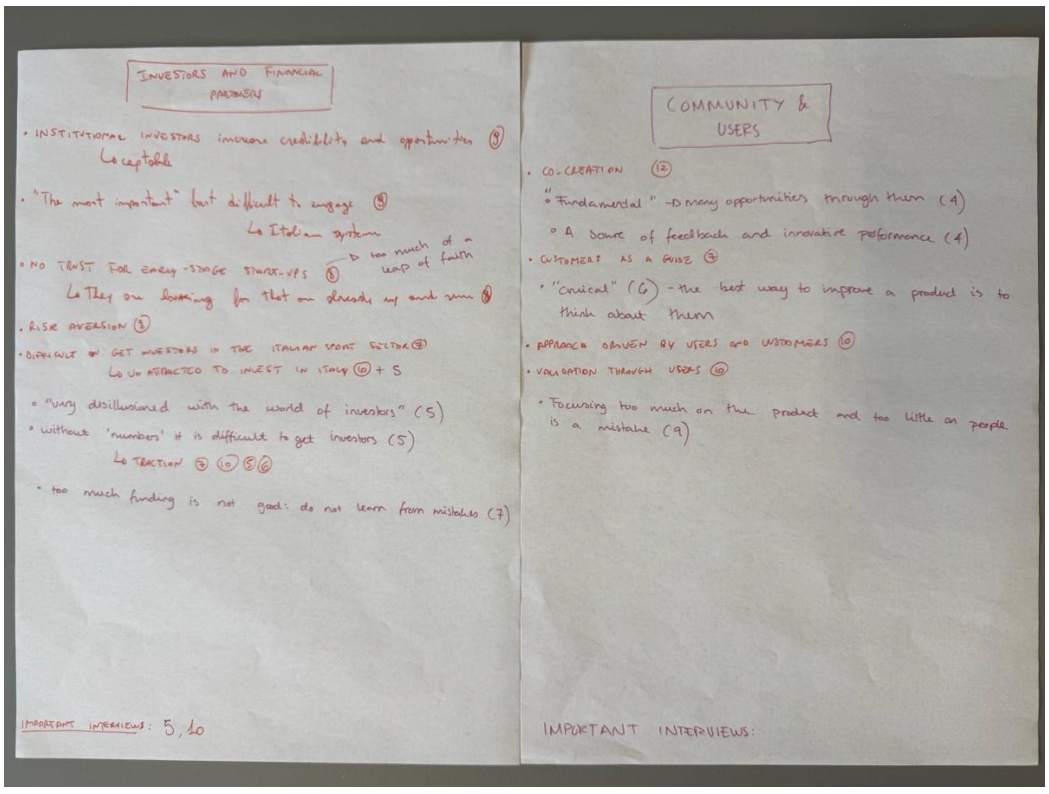


Figure 5*. Example of the in-depth sheets for each macro-theme with references to the interviews.*

At the same time, a sheet with theories and literature background (Figure 6) was prepared to collect relevant theoretical references from the reading and analysis of the interviews. At this stage, the theories were not directly linked to the themes but simply archived as potential interpretative keys.

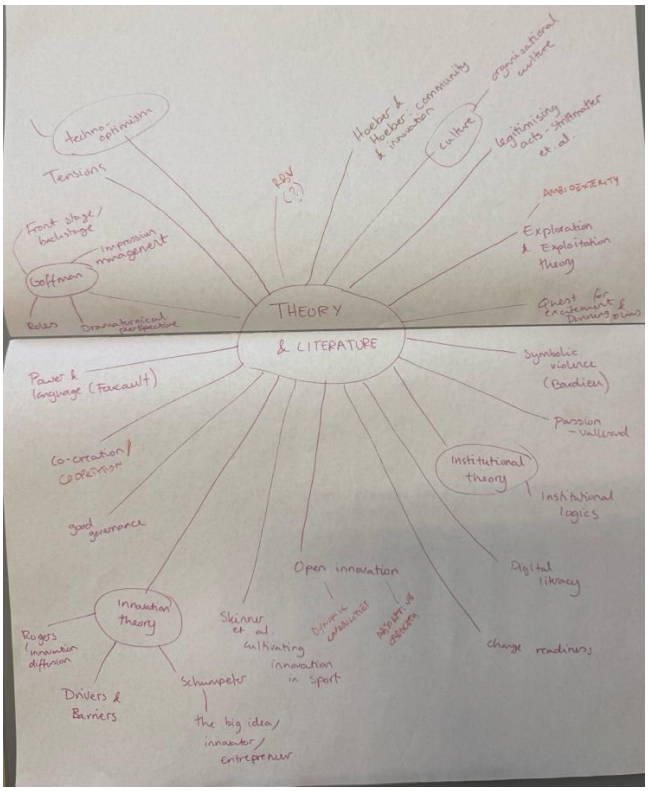


Figure 6. *Sheet used to collect theoretical references.*

Only later were the theories linked to the issues that emerged during the discussion between researchers. This made it possible to identify conceptual connections and construct a coherent interpretative framework and to outline a work plan for writing process.

3.5 Chapter 7 - Mapping Open Innovation strategies among sports start-ups in Europe

The third study is based on a quantitative approach and analyses the OI strategies and collaboration configurations adopted by European sports start-ups.

The survey was developed on the basis of the conceptual results of the scoping review, in particular the actors and strategies identified, and with reference to the main methodological

contributions of Ahn *et al*. (2015), Laursen & Salter (2006), Zhu *et al*. (2019) and Zhang *et al*. (2021). The questions were designed to measure, in a way that is comparable across countries, the use of openness strategies and the intensity of collaborative relationships. The structure of the survey allowed me to build a 4x8 conceptual matrix, which crosses the four OI strategies – (1) inside-out, (2) outside-in, (3) coupled, (4) outside-out — with eight categories of actors: (1) Governments and Policymakers, (2) Universities and Research Institutions, (3) Large Companies, (4) SMEs and Start-ups, (5) Investors and Financial Partners, (6) Intermediaries and Knowledge Brokers, (7) Technology and Service Providers, (8) Users and Customers. For each of the 32 actor-strategy combinations, executives indicated the degree of use on a seven-point Likert scale (1 = not at all; 7 = to the greatest extent). The values were also used to calculate two summary indicators of strategic openness: breadth and depth (Laursen & Salter, 2006). *Breadth* represents the extent of collaborations activated for each strategy and measures the horizontal diffusion of OI practices with different actors. *Depth* reflects the intensity of the relationship with each actor through multiple strategies, indicating greater vertical integration in the innovation processes (Laursen & Salter, 2006). A representation of the matrix is shown in Figure 7.

	Inside-Out	Outside-In	Coupled	Outside-Out	DEPTH
Government and Policymakers					
Universities and Research Institutions					
Large Companies					
SMEs and Start-ups					
Investors and Financial Partners					
Intermediaries and Knowledge Brokers					
Technology and Service Providers					
Users and Customers					
BREADTH					

Figure 7. *Representation of the 4x8 conceptual matrix used with breadth and depth [source: Author's own elaboration].*

To ensure clarity and transparency, each set of questions was introduced by a brief definition with some examples has been provided for each actor. Figure 8 shows the structure of the questions relating to a specific actor (Intermediaries and Knowledge Brokers). For each actor, the first question refers to the inside-out strategy, the second to the outside-in strategy, the third to the coupled strategy and the fourth to the outside-out strategy.

23. Intermediaries and Knowledge Brokers *

Individuals who facilitate connections between different players (e.g. incubators, accelerators, technology transfer offices), offering mentoring, training and access to resources

	Not at all	To a very limited extent	To a limited extent	To some extent	To a moderate extent	To a considerable extent	To the greatest extent
Have you provided data or expertise to Intermediaries or Knowledge Brokers?	○	○	○	○	○	○	○
Have you received support in terms of knowledge, technology or access to networks from Intermediaries or Knowledge Brokers?	○	○	○	○	○	○	○
Have you worked closely with Intermediaries or Knowledge Brokers to innovate?	○	○	○	○	○	○	○
Has your start-up actively contributed to connecting Intermediaries or Knowledge Brokers with other actors?	○	○	○	○	○	○	○

Figure 8. *Example of the structure of the questions asked for one of the ecosystem actors. [source: Author's own elaboration].*

In addition to the section dedicated to OI strategies, the survey included questions related to company profile (year of foundation, country of headquarter, sub-sector, business model, income stream) and resources and organisational structure (number of employees, stage of development, capital raised).

The survey was administrated online between May and August 2025 to a sample of 886 European sports start-ups. These were selected through mapping conducted on specialised databases (SportTechX, Dealroom and Crunchbase) and then verified to ensure their activity and consistency with the inclusion criteria. The final sample consisted of 209 completed

surveys from different European countries, representing the main segment of the sport market (Figure 9).

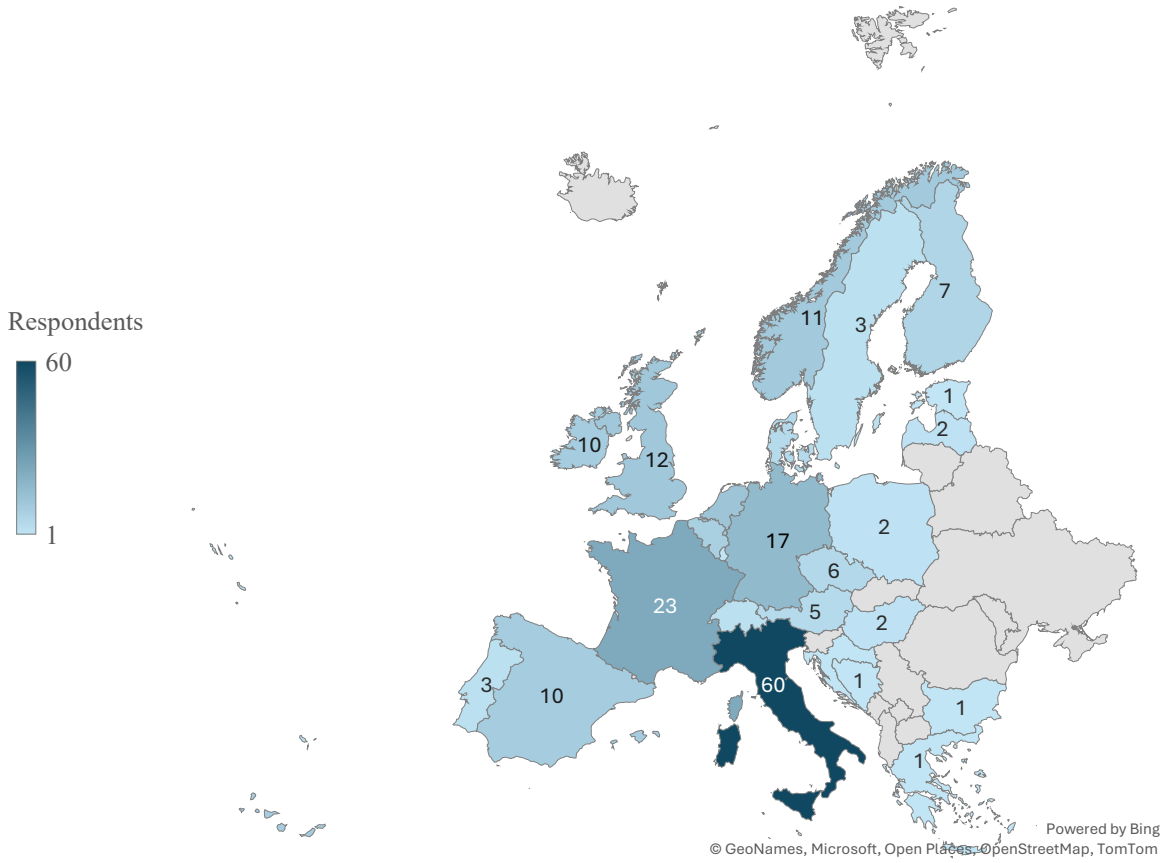


Figure 9. *Geographical distribution of European sports start-ups that responded [source: Author's own elaboration].*

The data collected was analysed using descriptive statistics, Principal Component Analysis (PCA) and cluster analysis (hierarchical and k-means methods) to identify homogeneous configurations of openness strategies. The analyses identified four strategic cluster of start-ups, distinguished by composition, collaboration logic and degree of openness, offering a systematic view of OI practices in the European sports context.

3.6 Ethical and quality considerations

All stages of the research were conducted in accordance with the ethical principles commonly recognised in academic research and in compliance with current regulations on the protection of personal data (EU Regulation 2016/679 – GDPR). Participation in the survey and interviews was voluntary and subject to informed consent, with each participant having the option to

withdraw from the study at any time (Hesse-Biber & Leavy, 2010). In the qualitative study (Chapter 6), interviews were processed using pseudo-anonymisation. Each participant was assigned a pseudonym after completing the thematic summary sheet. At the beginning of each interview, the interviewer explained the purpose, methods and data management, requesting for explicit consent for recording. The files containing the transcripts and translations were stored on secure university databases accessible only to the research group ensuring confidentiality. Some executives, despite indicating their availability in the survey, did not respond to the invitation to be interviewed. However, all those who participated agreed to be recorded after receiving the required information. In the quantitative study (Chapter 7), the survey included an introductory page describing the research aims, the use of the data and the rights of participants, including the option to stop completing the survey anytime. Few managers chose to stop completing the survey after the first questions, stating that they did not wish to provide further information. The data collected was processed anonymously. During cleaning, all identifying elements were removed, creating a dataset without personal references, stored on secure university servers and accessible only to the research group.

Regarding quality considerations, in Chapter 5, a methodological issue concerns the use of a single search string to identify contributions in literature. This choice was made with the aim of maintaining conceptual consistency and terminological rigour respecting the construct analysed but may have excluded studies that use similar expressions. To mitigate the risk of excluding studies, the research was conducted on three major international databases and supplemented by an analysis of secondary bibliographic references (snowballing), ensuring adequate coverage of the relevant literature. In Chapter 6 sampling was based on self-selection, involving companies that, at the end of the survey, had expressed their willingness to participate in a qualitative in-depth study. This technique may generate a bias (Hesse-Biber & Leavy, 2010), as it may lead to the involvement of subjects who are particularly confident in their start-

up or especially interested in OI. However, the diversity of the fifteen executives interviewed in terms of sub-sector, stage of development and size made it possible to obtain a heterogeneous and informative set of cases. In the case of Chapter 7, my Italian nationality and contacts in the sector may have encouraged greater participation by Italian start-ups (60 responses out of 209 – 28,7%), resulting in a slight national over-representation. It is also possible that the surveys being administered in English in all other countries (for Italian start-ups it was in Italian) discouraged participation by managers with limited language skills, favouring responses from more internationalised companies or those with more established organisational structures. Before distribution, the survey was tested with a group of three sports start-ups executives and two directors of Italian and foreign accelerators to verify the clarity, length and consistency of the questions and ensure the quality of the tool.

4. The impact of culture on sport innovations

Canini, D., & Tjønndal, A. (2025). "5: The impact of culture on sport innovations". In *Handbook on Sport and Culture*. Cheltenham, UK: Edward Elgar Publishing. Retrieved Oct 30, 2025, from https://doi.org/10.4337/9781035339983.00013

Introduction

If we agree that culture is a shared system of values, beliefs, and attitudes, it follows that different national and organisational cultures will have different orientations towards innovations in sport. These cultural differences impact how sport organisations approach and seek to solve the issues they face. Despite such differences, one thing is certain: The multifaceted challenges that characterise sport organisations call for solutions formed through innovative and creative thinking (Jones *et al*., 2021). Most managers, board members and policymakers in sport would agree that tackling wicked problems – from social inequality in participation to the climate crisis' impact on competitions or human-rights issues in host countries – require collaborative efforts beyond sport itself and innovative solutions. Knowing this, why are some sport organisations resistant to adopting innovations while others excel at innovating? The answer to this question is, at least partly, found by examining sporting cultures.

Depending on what sources of information you rely on, sport is described as a creative space that fosters innovation (Skinner *et al*., 2018; Balmet *et al*., 2012), or an area characterised by traditionalism and resistance to novel technologies and approaches (Trabal, 2008; Luczak *et al*., 2020). Both narratives hold some degree of truth in them. These antagonistic descriptions of the innovative capacities of sport organisations, however, can be understood through investigations of cultural differences between sports. Some sports, such as cycling or Formula 1, have a history of relying on technological innovations for performance advancement (Næss & Tjønndal, 2021; Fouché, 2017). Cycling was among the first sport to adopt virtual

competition formats using interactive peripheral sports equipment (Fouquaert *et al*., forthcoming). Other sports have historically resisted any kind of change, technological, cultural or organisational (Balmer *et al*., 2012; Luczak *et al*., 2020). In these sports, novel technologies are often met with scepticism and heated debates about the threat such innovations represent for the ethos of the sport. Two examples include the introduction of video assistant refereeing (VAR) in football and the banning of shark skin swimsuits in Olympic swimming (Tjønndal, 2023).

Since the early 2000s, however, a broader debate on the management of Open Innovation (OI): knowledge flow within and across organisational boundaries (Chesbrough, 2003), has also begun to influence sport. Sport organisations have followed the same trajectory of other sectors, moving from closed R&D processes to Open Innovation Ecosystems (OIEs). In an OIE, league, clubs, start-ups, universities, government bodies and even fans co-create solutions that no single actor could develop on its own. Such open environments may accelerate innovation processes if a sport organisation acts as an "orchestrator" by fostering a culture of internal and external openness among participants (Canini *et al*., forthcoming).

Building on the premise that culture impacts sport organisations' orientations towards innovation, in this chapter we discuss the ways in which culture may act as a driver, or a barrier, for sport innovations. Innovation here encompasses political and organisational reforms (incremental innovation, process oriented), social movements and responses to sustainability challenges (social innovation), or the development of new sports equipment and technological tools (radical innovation, disruptively oriented). Recent developments in OI and OIEs are considered in the discussion as a potential new lens for understanding how culture influences innovation in sport. The chapter proceeds as follows: First, a description of what sport innovation is, building on the sport innovation typology as published in The European Journal for Sport and Society (Tjønndal, 2018a); then we move on to discuss how culture may act as a

driver for innovation in sport, before flipping the coin and outlining instances where culture becomes a barrier for innovation.

Sport innovation

The development of most sports heavily relies on technology and innovation (Loland, 2002). By introducing new ideas, changes, and technological advancements, innovation transforms how sport is played and organised (Tjønndal, 2018b). For this reason, we decide to adopt the five-type typology of sport innovation proposed by Tjønndal (2018a). The paper argues that, while we tend to think about innovation in sport as synonymous with sports technology, sport innovation can occur in many forms: As emergence of new competition formats and activities (e.g. parkour, esports and virtual sports), new sporting equipment (e.g. carbon fibre soles in running shoes), technological tools (e.g. Artificial intelligence and wearable technology for athlete monitoring), or new rules and regulations in sport (e.g. reform and policy development). Tjønndal (2018a) categorised five different types of innovation in sport: (1) social, (2) technological, (3) commercial, (4) community-based and (5) organizational.

Social innovation in sport refers to the use of sport as a tool to address social challenges and bring about positive change either within sport or by addressing societal issues through the use of sport (Tjønndal, 2021). For instance, social innovation arises when sport organisations or individuals (such as athletes and coaches) are faced with social issues that requires new and creative solutions (Tjønndal, 2016). In this way, social innovation involves creating and implementing new ideas, strategies, and practices that leverage the power of sport to promote social wellbeing, inclusion, and development. This can include initiatives aimed at improving health, fostering social cohesion, empowering marginalised groups, and addressing issues like poverty, inequality, and discrimination. A current example of social innovation in sport is the

UK based football initiative Kick it Out (Kick it Out, n.d.), born to combats discrimination in football (racism, sexism) by running educational programs for players, fans and clubs.

Technological innovation in sport involves the development and application of new technologies to enhance aspects such as sports performance, injury prevention and management, sport stadiums and fan engagement (Tjønndal, 2023). These innovations can often be radical with the aim to revolutionise how athletes train and compete, improve safety and fairness, or enrich experiences of fans and spectators. An example of technological innovation that has received much attention lately is artificial intelligence (AI) for sports coaching. While there are new AI-powered technologies for sports coaching being released continuously, a well-established example is Catapult (Catapult, n.d.). Catapult is a company that utilises AI, wearable technology and advanced data analytics to provide sports performance insights across different sports, including basketball, rugby, ice hockey and football.

The core of commercial innovation are private companies and businesses who develop and sell sports related products. These types of innovations are (of course) often product innovations (Fuller *et al*., 2007). Still, there are plenty of examples of processed-based innovations that are commercially oriented (Hyysalo, 2009: Fredberg & Piller, 2011). A recent example of commercial innovation is Manchester City's launch of a football stadium in the Metaverse (The Plan, n.d.). Through a partnership with Sony, Manchester City created a virtual version of Etihad Stadium in the metaverse – a virtual universe that people can explore as digital avatars. This digital version of the stadium will have unlimited seating, offering a substantial commercial potential for the football club by marketing digital products through the metaverse. Commercial innovations have grown substantially in sports the last two decades, a development that is closely tied to the increasing commercialisation of both leisure and professional sports. With this development of the sports sector, the boundaries between

voluntary sector (voluntary sports clubs) and private sector (commercial sport business) are blurring, and there are more and more cases of innovations that develop through partnerships between them. These types of sport innovations may often sit at the intersection of commercial, social and community-based innovation.

Community-based innovation involves social responsibility and entrepreneurship in which individuals and sport organisations partner with local community groups to encourage working towards a common goal (Hoeber *et al*., 2015; Hoeber & Hoeber, 2012). This can often be related to social issues and social innovations. In other words, community-based innovation in sport focuses on using sports initiatives to address local community needs and create positive social impact. This type of innovation involves collaboration with community members, local organisations, and other stakeholders to design and implement sport programs that foster social inclusion, promote health and wellbeing, and address specific challenges faced by the community. There are many examples of community-based innovations, especially within the Sport for Development and Peace sector. One example from the USA is Midnight Basketball. Midnight Basketball programs have been implemented in various neighbourhoods to address youth crime and provide positive alternatives to gang involvement and other criminal activities (Green, 2009). These programs partner with local police departments to ensure the safety of participants and build positive relationships between youth and law enforcement. The aim of these programs is to contribute to positive youth development locally by offering participants mentorship from community leaders, as well as aid in the development of important life skills and improve academic performance.

Lastly, organisational innovation involves the development and implementation of new policies and practices within sport organisations to improve efficiency, effectiveness, and adaptability. This type of innovation can encompass a wide range of areas, including management strategies, governance, operational workflows and talent development. The goal is to enhance the overall

performance of the organisation and ensure it can meet the evolving demands of the sports industry. (Miragaia & Ferreira, 2016; Winand *et al*., 2013). The UCI's development of novel competition formats using technology (virtual cycling) may be interpreted as an example of organisational innovation in sport. Another current example is IOC's development of a framework on fairness, inclusion and non-discrimination on the basis of gender identity and sex variations (International Olympic Committee, 2021). It is a comprehensive policy initiative aimed at ensuring that participants in the Olympic Movement are treated with respect and fairness, promoting inclusive practices and preventing discrimination.

The five-type typology clarifies what being innovate in sport means, but we must also consider how these innovations take shape. The cases we have highlighted: Catapult's data sharing, Manchester City's metaverse venture with Sony, and community initiatives, demonstrate a shift toward open, ecosystem-based approaches to sport innovation, enabled through the opening of organisational boundaries, orchestrated networks and multi-actor collaborations. Because new ideas frequently combine elements from different sport innovation categories, the typology is neither clear-cut nor normative; rather, it provides a descriptive map that we can read alongside the OI lens to understand cultural conditions that foster or hinder innovation. From this theorisation of sport innovation and OI, in the following we discuss how culture may act as an innovation driver.

Culture as a driver for sport innovations

Building on the six cross-disciplinary conceptualisations of culture and the seven-dimensions structure of culture this handbook is founded upon (see the introduction chapter in this book), there are several ways in which culture plays a vital role in driving innovation in sport. Culture is a driver for innovation in sport organisations when it encourages creativity and experimentation (second and fourth dimensions of culture). This implies a culture that inspires

and allows athletes, coaches, and staff to experiment with new ideas and approaches without fear of failure. This cultural driver for innovation can also be linked to fundamental cultural values such as individualism-collectivism. When sport organisations encourage a culture of creativity, this drive is based on some specific beliefs. For example, that if we allow individuals to thrive (as opposed to work as a team) they will become more creative. In professional sports, an example of a commercial organisation that has created a reputation and brand for fostering creativity and experimentation among athletes is the sporting teams of Red Bull. Red Bull is known for taking innovative approaches to developing athletes. Two recent examples include the Oracle Red Bull Racing Esports Athlete Development Programme and Red Bull Junior Brothers.

Oracle Red Bull Racing, in partnership with the crypto trading company Bybit, launched the Bybit Performance Accelerator, an innovative esports athlete development program aimed at enhancing physical and mental performance through tailored training by industry experts (Oracle Red Bull Racing, 2023). The second example is The Red Bull Junior Brothers program, developed in partnership with the professional cycling team BORA – Hansgrohe. The program is a global scouting initiative aimed at identifying and developing the next generation of professional road cyclists by allowing young cyclists around the world to compete for pro contracts through logging workouts on the virtual cycling platform Zwift, with top performers receiving athlete partnership deals and training. Using virtual cycling, the program further combines physical and mental training, offering personalised support to help young athletes reach elite levels (Red Bull, 2023). Red Bull's culture of testing new approaches often leads to advancements in their sports teams, with Red Bull athletes frequently setting new world records across a wide variety of sports such as cycling, Formula 1, extreme sports and esports. These successes are attributable to a culture which can be said to drive innovation through beliefs and practices that promote creativity, collaboration and interdisciplinarity.

When the culture of a sport organisation encourages creativity, interdisciplinary collaborations and innovation hubs are sometimes established. There are many examples of this in sports, a prominent one being Barça Innovation Hub (FC Barcelona, n.d.). The Barça Innovation Hub is FC Barcelona's research and innovation centre, dedicated to 'transforming the sports industry' through knowledge and technology. The hub is founded on interdisciplinary collaboration with academic institutions, tech start-ups, and industry experts to drive advancements in elite football. For culture to act as a driver for innovation in sport organisations, encouraging creativity, experimentation and interdisciplinary collaboration is closely linked to the organisation's approach to technological advancements. Innovation and research centres such as Barça Innovation Hub, or athlete development programmes such as Red Bull's Junior Brothers, depend on the adoption of new technologies. For such innovations to develop, sport organisations must embody a forward-thinking culture which embraces novel technologies such as AI, wearables and data analytics. This entails the first and third dimensions of culture (a culture which is normative in its approach to cutting-edge technology as significant for sport development (1), which influences the practices of the organisation (3)).

The above-mentioned examples use symbols to focus on fostering a culture that drives technological innovation or commercial innovation in sport organisations (Tjønndal, 2018a). However, culture may also be a driver for social innovation, organisational innovation and community-based innovation in sports organisations (Tjønndal, 2018b; 2021). To foster these innovations in sport organisations, however, requires different nomos, beliefs and systems, compared to the commercially driven innovations often found in elite sports teams. For culture to act as a driver for social innovation, it is a prerequisite that the organisation's systems and practices (first, third, fourth and fifth dimensions of culture) fosters inclusivity and diversity. This means cultivating diverse perspectives on all aspects of the organisation, which enables the development of innovative solutions and approaches to social issues (Corthouts *et al*.,

2019). Examples of such innovative solutions are often developed as organisational innovation (Tjønndal, 2018b), for instance as inclusion policies of sport organisations. Internationally, one such policy which has received notable attention lately is the IOC's framework on fairness, inclusion and non-discrimination on the basis of gender identity and sex variations (International Olympic Committee, 2021). Another example from a national sport organisation, is the development and adoption of the Rainbow Lighthouse initiative in The Norwegian Basketball Federation. The initiative is a collaboration with LBGTQ+ rights organisations, and is a commitment to diversity and inclusion, promoting inclusion within basketball to ensure safe and welcoming environments for all participants. The initiative focuses on education, advocacy, and implementing policies to foster equality and prevent discrimination in the sport (Norwegian Basketball Federation, 2021).

As illustrated here, culture as a driver for sport innovations relates to intraorganisational factors. For social innovations, previous research suggests that a strong mission-driven culture is essential for promoting innovation (Jones *et al*., 2021). This is evident in non-profit organisations, especially in fields such as sport for development and peace (SDP), climate activism through sport, or anti-discrimination organisations in sport. Here, research shows that compassion and empathy (Decety & Jackson, 2006), is crucial for motivating social innovation. Opportunities for innovation also rely on the perceived legitimacy of social issue (Miller *et al*., 2012) and their alignment with volunteers and staff's personal values (Dart, 2004; Welty Peachey *et al*., 2018). However, broad missions of many SDP, social justice and climate activist organisations in sport can lead to misaligned expectations and high staff turnover due to burnout (Halsall & Forneris, 2016; Svensson *et al*., 2017). To foster social innovation, these organisations must articulate clear, change-oriented missions (Glisson, 2015) and provide comprehensive training to attract and retain innovative individuals (Newton *et al*., 2014). Emphasizing shared values and cohesion in these programs can promote social innovation,

while external opportunities for training and support can supplement internal efforts (Jones *et al*., 2021).

To sustain mission-driven cultures in non-profit sport organisations over time, it's vital to embed innovation as a core organisational pillar (Jones *et al*., 2021). Research on OIE indicates that this pillar cannot be based solely on internal processes. It is necessary to recognise the multiplicity of actors involved and go beyond organisational boundaries to build relationship based on trust that facilitate the continuous exchange of knowledge and resources (Canini *et al*., forthcoming). Without this trust, the risk of "mission drift" due to competing institutional, legal, and financial pressures is significant (Svensson, 2017). Emphasising the results of social change work and recognising volunteers and staff for productive behaviour can reaffirm mission-driven cultures and encourage social entrepreneurship and innovation (Walk *et al*., 2019).

The examples of innovative practices from elite sport organisations, sport industries

and non-profit sport organisations outlined here, illustrate how culture can play a vital role in promoting innovation when it encourages creativity, experimentation, and interdisciplinary collaboration. For sport organisations focused on technological innovation or commercial innovations, the adoption of new technologies remains crucial; for those engaged to foster social innovation, community-based innovation or organisational innovation, cultivating diversity and a mission driven culture is also necessary. In an OIE, such innovative cultures are consolidated when an “orchestrator” (e.g. RedBull or Barça Innovation Hub) establishes open collaborative platforms, defines shared governance rules and systematically invest in trust between heterogenous actors, which is key to the maturation of innovative ideas and projects (Canini *et al*., forthcoming). Embracing these cultural dimensions, together with the ability to

cultivate trusting relationships between different actors, may work to keep sport organisations responsive, impactful, and truly innovative.

Culture as a barrier for sport innovations

While culture can drive innovation, it may also act as a significant barrier. Certain cultural attitudes, behaviours, and practices within sport organisations work to stifle creativity, resist change, and hinder the adoption of new ideas and technologies. The opening of organisational boundaries also presents cultural barriers: for example, when power dynamics within the ecosystem are skewed in favour of certain actors, generating a lack of mutual interdependence or a lack of trust to share knowledge and risks (Canini *et al*., forthcoming). Furthermore, in many sport ecosystems the absence of clear governance on intellectual property and benefit sharing inhibits the flow of ideas between partners, reinforcing existing power inequalities (Canini *et al*., forthcoming). Understanding these cultural barriers is central to fostering an environment that supports innovation.

Resistance to change in general, and new technologies specifically, is one aspect of how culture may become a barrier for sport innovations (first and third dimension of the seven-dimensions of culture). While sports such as Formula 1 (Næss & Tjønndal, 2021), cross-country skiing (Svensson & Sörlin, 2018) and cycling (Fouché, 2017) are generally considered as contexts that embrace and cultivate technology development, other sports are known for their traditionalist approach to coaching and training methods, organisational structures and competition formats. Some examples of such sports are equestrian sports, football and boxing. Boxing for instance, has resisted the adoption of force sensor technologies in refereeing, while other combat sports have adopted such technological innovations. Football organisations, while having adopted VAR as a novel refereeing technology, are faced with substantial backlash and

resistance from fans, players and coaches, who argue that VAR technology disrupts the flow of the game and undermines the authority of on-field referees.

Traditionalism, resistance to new technologies or change in general is of course not as black and white as some sports being 'pro-innovation' and some sports being 'anti-innovative'. There are differences between sport organisations within the same sport in their approach to technology and change. This is where the importance of culture for sport innovations becomes visible. For instance, Fouquaert *et al*. (forthcoming) mapped and analysed cycling and triathlon clubs' beliefs about the usefulness and potential of virtual cycling to improve club performance and achieve sport-for-all policy goals. The findings indicate that even within sports who are hailed as innovative and technology driven, clubs have different approaches to technological innovations and novel competition formats such as virtual cycling. Some of the clubs investigated by Fouquaert *et al*. (forthcoming) were highly sceptical of virtual cycling and had little faith in the potential of this technological innovation to improve club performance or achieve sport-for-all goals. Of course, one could argue that these clubs simply do not believe in the specific innovation of virtual cycling, as opposed to technological innovation itself. Yet, other clubs in Fouquaert et al.'s survey were highly optimistic and placed a great deal of value on virtual cycling as a tool to achieve club performance and sport-for-all goals (first, second and fourth dimensions of the seven-dimensions culture). While some clubs believe that virtual cycling could improve club performance but not contribute to achieving sport-for-all goals, demonstrating the impact of culture on approaches to technological innovation in sport organisations.

What then, impacts a sport organisation's beliefs about a specific innovation? Any social scientist would be quick to conclude that there are many factors that influence such beliefs. Managerial and individual determinants are two types of factors that influence the culture of a sport organisation, and in turn, how sport organisations approach innovations. Managerial

determinants encompass the board's attitude towards change and the extent to which knowledgeable and innovation-minded leaders are present in the organisation (Best *et al*., 2021; Corthouts *et al*., 2019), while individual determinants relate to how an innovation is perceived by key individuals in the organisation. In the case of sport organisations this could be a head coach, a star player, a president or a secretary general. How an innovation is perceived is also a key aspect of predicting innovativeness in Everett Rogers' (2003) Diffusion of Innovations.

Perceptions of technological innovation among key individuals and management can significantly shape an organisation's culture, acting as either a driver or barrier for sport innovations. A notable cultural barrier for innovation is often a lack of diversity in management. Solheim (2022) points out how research has thoroughly documented the benefits of diversity in organisations, such as increased creativity, better decision-making and innovativeness. Diversity challenges consensus and conventional methods (Clearfield & Tilcsik, 2018); in OIE terms, homogeneous teams and boards tend to recruit similar partners, restricting the network and reducing the diversity of knowledge needed to innovate (Scaliza *et al*., 2022).

Diversity in management and teams (or the lack thereof) impacts how successful social innovations and organisational innovations are something which is often visible through the development and implementation of novel policies in sport. For instance, policies directed at improving rights for non-binary athletes are more likely to work as intended if a variety of non-binary athletes are included in the development of such policies. Policies aimed at recruiting and retaining women in elite sports coaching are more likely to work if they include women coaches in the development, and so on. The point here is that from the perspective of innovation theory, a lack of diversity in teams and management can lead to a narrow range of perspectives and ideas, limiting creativity and innovative capacity (Solheim, 2022). For most, it is easy to see this point in the lens of social innovation or organisational innovation (as the two examples

mentioned here are). However, diversity is equally important for technological innovation, as documented by decades of research in the field of Science and Technology Studies (STS) (Tjønndal, 2024). A lesson from this research field is that the male dominance in technology development professions leads to distinct gendered experiences with technological innovations. For example, Apple's Siri and Amazon's Alexa have been found to work better for men, than women (i.e. they understand male voices better than female voices) (Wachter-Boettcher, 2018). Likewise, if you ask ChatGPT and other generative AI language models to create text for you, these texts will often be riddled with gendered biases (just try asking ChatGPT to create a love story including a CEO and a nurse) or racialised biases.

A third cultural barrier for sport innovations is the inherent short-term focus and competitiveness of elite sports. A well-known challenge for high performance sports organisations is balancing immediate sports success (short-term focus) with long-term development to ensure sustained high performance over time. The culture of a sport organisation impacts the patience coaches, managers and athletes have with failure. A culture that prioritises short term success over long term development can hinder investment in innovative practices that may take time to show results, as for OI practices. Coupled with the pressure to perform may lead to a focus on immediate outcomes (winning the next competition) rather than experimenting with new methods and technologies. In many cases, athletes and coaches may hesitate to adopt innovations or contribute to fostering innovation in fear of failure. Failing in high performance sports often means being replaced. A Formula 1 racer who does not earn points and win races will not make it to the next season, and a Premier League manager will quickly be sacked if the team loses too many important matches. The short-term focus of elite sport organisations may in some cases hinder the development of long-term strategies and innovative practices that require time to implement and show results, illustrating how the culture of elite sports may act as a barrier for innovations. The competitiveness of

high-performance sports may also make sport organisations sceptical of knowledge sharing and collaboration, hindering the development of ground-breaking innovations in sport. After all, in high performance sports you innovate to achieve some sort of marginal gain, a slight edge that sets you apart from your competitors and allows you to take home the gold. However, from an ecosystem perspective, this culture of competition erodes mutual trust and prevents the co-creation of shared platforms, an essential condition for an OIE to produce innovations (Canini *et al*., forthcoming).

Conclusion

This chapter examined how culture may act as both a driver and barrier for innovation in sport organisations, demonstrating that a sport organisation's approach to innovation is deeply intertwined with cultural dynamics. The different responses to innovation – ranging from early adoption of new technologies to resistance – can be better understood through the seven dimensions of culture outlined in the introduction chapter of this book. Analysed through the OI lens, these responses reflect how the opening (or closing) of organisational boundaries amplifies the cultural potential and the fragility of individual actors, highlighting issue of trust, knowledge flow and power balance in ecosystems (Canini *et al*., forthcoming).

Building on the broader discussion of how culture influences innovation, the first dimension – culture as an organized, shared, and learned system – provides a clear framework for understanding why certain sport organisations, particularly those deeply rooted in tradition, are more resistant to adopting new methods, approaches and ideas. In sports like football and boxing, strong traditionalist values shape the organisational culture, leading to reluctance in adopting new technologies such as VAR (football), automated punch-counting systems (boxing) or innovations in management practices. This cultural resistance may stem from the normative nature of the historical identity of each sport, which prioritises continuity and

tradition over experimentation and change, limiting the potential knowledge flow from external partners. While some sports and sport organisations demonstrate cultural resistance, the second dimension of culture, which sees it as evolving and innovative, offers a striking contrast. In sports like Formula 1 and cycling, innovation is not merely accepted but is woven into the organisational identity of many professional teams, international and national federations. These organisations view technological advancements as essential to their success, continuously testing new ideas and methods. Formula 1's reliance on cutting-edge engineering and data analytics, or cycling's early adoption of virtual cycling technologies, exemplifies how culture can foster an innovative environment, transforming team into orchestrators of open networks with technology providers, universities, start-ups, and defining IP rules that encourage co-creation.

Moving from a focus on cultural evolution, the third dimension – culture's role in establishing nomos, or order – deepens our understanding of the varied responses to innovation. This perspective is imperative in explaining how different organisations within the same sport may embrace or resist change based on their desire for stability. The process of typification, which provides predictability and order, plays a key role here. For instance, as highlighted by Fouquaert *et al*. (forthcoming), some cycling and triathlon clubs readily embrace virtual cycling as a new sporting format for its perceived benefits in performance and inclusivity, while others resist it, perhaps due to the disruption it causes to their established norms. In this case, culture operates as both to ensure stability and as a force for innovation, depending on how tightly an organisation adheres to its typified practices. In such cases, transparent OI governance can transform these established norms through a shared framework, thereby reducing fear and resistance to innovation.

While the third dimension focuses on how culture provides order, the fourth and fifth dimensions introduce a more complex view by considering culture both as an abstract category

and as a lived system of practices. This shift highlights the dynamic interplay between theoretical ideals and the concrete practices that drive innovation in sport organisations. Innovation develops through the practices and symbols that individuals and teams use to achieve their objectives. For instance, the cultural push towards greater inclusivity and diversity, such as the Norwegian Basketball Federation's Rainbow Lighthouse initiative, shows how sport organisations can leverage cultural symbols and practices to drive social innovation. Concrete initiatives of inclusion such as these reduce fears associated with knowledge-sharing (the so-called liability of openness) and foster trust between heterogeneous partners (Scaliza *et al*., 2022).

Having established the connection between abstract cultural frameworks and practical actions, the sixth dimension (culture's relation to the system of production) further clarifies how these cultural influences manifest differently in commercial versus non-profit sport organisations. Here, the economic and structural foundations of each organisation shape their distinct approaches to innovation. In professional sports, the ownership of resources, division of labour, and focus on performance outcomes create a culture that values technological and data-driven innovations. The Barça Innovation Hub and Red Bull Junior Brothers serve as examples of how forward-thinking approaches lead to significant advancements in performance. However, non-profit organisations, such as those in the sport for development and peace (SDP) sector, often foster innovation through a mission-driven culture that prioritises community-based and social innovation over purely commercial gains. From an OIE perspective, the orchestrator has the task of aligning long-term mechanisms between different actors to prevent free-riding phenomena by consolidating the culture of innovation within the ecosystem. Beyond the economic structures that shape innovation, the seventh dimension of culture delves into its political significance. This dimension is crucial for understanding how sport organisations approach inclusivity and diversity, areas where cultural and political forces intersect to either

enable or inhibit social innovation. As Solheim (2022) noted, diverse teams tend to foster greater creativity, and this is especially true for sport organisations that prioritize inclusivity as a core value.

Thus, while the multiple dimensions of culture can foster innovation, they can also create substantial barriers. As this chapter has illustrated, resistance to change, the persistence of tradition, and leadership dynamics all contribute to the complex relationship between culture and innovation in sport organisations. The short-term focus typical of high-performance sports, combined with the pressure to succeed immediately, often discourages experimentation and long-term planning. This resistance is further compounded by the competitive nature of elite sports, which fosters scepticism towards collaboration and knowledge sharing—both critical components of innovation. These barriers manifest themselves in low trust, weak governance and mechanisms that prevent shared ideas from maturing within ecosystems that should instead be sources of innovation (Canini et al., forthcoming). For sport organisations to foster innovation, they must address these cultural barriers by promoting inclusivity, long-term strategic thinking, and openness to experimentation, failure and change. By understanding and adapting the cultural attitudes and through deliberate cultural shifts, sport organisations can break through these barriers and create the conditions necessary for continuous, impactful innovation.

References

Balmer, N., Pleasence, P., & Nevill, A. (2012). Evolution and revolution: Gauging the impact of technological and technical innovation on Olympic performance. *Journal of Sports Sciences, 30*(11), 1075–1083. https://doi.org/10.1080/02640414.2011.587018

Best, A., Sibson, R., & Morgan, A. (2021). Technology adoption and use in not-for-profit sport: A case study of an Australian state sporting association. *Managing Sport and Leisure*, 1–19. https://doi.org/10.1080/23750472.2021.2020678

Canini, D., Tjønndal, A. & Vicentini, F. (forthcoming). Open innovation ecosystems: A scoping review and conceptual model for sport management, *Managing Sport and Leisure.*

Catapult. (n.d.). *About Catapult*. Catapult. https://www.catapult.com/company/about-catapult

Chesbrough, H. W. (2003). Open Innovation: The New Imperative for Creating and Profitin from Technology. Harvard Business School Press. https://books.google.it/books?id=4hTRWStFhVgC

Clearfield, C., & Tilcsik, A. (2018). *Meltdown: Why our systems fail and what we do about it*. Penguin Press.

Corthouts, J., Thibaut, E., Breuer, C., Feiler, S., James, M., Llopis-Goig, R., ... & Scheerder, J. (2019). Social inclusion in sports clubs across Europe: Determinants of social innovation. *Innovation: The European Journal of Social Science Research, 33*(1), 21–51. https://doi.org/10.1080/13511610.2019.1637247

Dart, R. (2004). The legitimacy of social enterprise. *Nonprofit Management and Leadership, 14*(4), 411-424. https://doi.org/10.1002/nml.43

Decety, J., & Jackson, P. L. (2006). A social-neuroscience perspective on empathy. *Current Directions in Psychological Science, 15*(2), 54-58. https://doi.org/10.1111/j.0963-7214.2006.00406.x

FC Barcelona. (n.d.). *Barça innovation hub.* FC Barcelona. https://barcainnovationhub.fcbarcelona.com/

Fouché, R. (2017). *Game changer: The technoscientific revolution in sports*. Hopkins Press.

Fouquaert, T., Tjønndal, A., De Clerck, T., & Willem, A. (forthcoming). Putting European sport-for-all policy goals into practice through innovation: Sport clubs' beliefs about virtual sports to improve club performance and achieve sport-for-all goals. *Innovation: The European Journal of Social Science Research*.

Fredberg, T., & Piller, F. T. (2011). The paradox of tie strength in customer relationships for innovation: A longitudinal case study in the sports industry. *R&D Management, 41*(5), 470–484.

Fuller, J., Jawecki, G., & Muhlbacher, H. (2007). Innovation creation by online basketball communities. *Journal of Business Research, 60*(1), 60–71. https://doi.org/10.1016/j.jbusres.2006.09.019

Glisson, C. (2015). The role of organizational culture and climate in innovation and effectiveness. *Human Service Organizations: Management, Leadership & Governance, 39*(4), 245-250. https://doi.org/10.1080/23303131.2015.1087770

Green, B. C. (2009). Sport as an agent for social and personal change. In *Management of sports development* (pp. 143-160). Routledge.

Halsall, T., & Forneris, T. (2016). Challenges and strategies for success of a sport-for development programme for First Nations, Métis and Inuit youth. *Journal of Sport for Development, 4*(7), 39-57.

Hoeber, L., Doherty, A., Hoeber, O., & Wolfe, R. (2015). The nature of innovation in community sport organizations. *European Sport Management Quarterly, 15*(5), 518–534. https://doi.org/10.1080/16184742.2015.1085070

Hoeber, L., & Hoeber, O. (2012). Determinants of an innovation process: A case study of technological innovation in a community sport organization. *Journal of Sport Management, 26*(3), 213–223. https://doi.org/10.1123/jsm.26.3.213

Hyysalo, S. (2009). User innovation and everyday practices: Micro-innovation in sports industry development. *R&D Management, 39*(3), 247–258. https://doi.org/10.1111/j.1467-9310.2009.00558.x

International Olympic Committee. (2021). *IOC framework on fairness, inclusion and non-discrimination*. International Olympic Committee. https://stillmed.olympics.com/media/Documents/Beyond-the-Games/Human-Rights/IOC-Framework-Fairness-Inclusion-Non-discrimination-2021.pdf

Jones, G. J., Wegner, C., Nols, Z., & Tjønndal, A. (2021). Intraorganizational factors associated with enabling and sustaining social entrepreneurship and social innovation in sport for development and peace. In M. McSweeney, P. G. Svensson, L. M. C. Hayhurst, & P. Safai (Eds.), *Social innovation, entrepreneurship, and sport for development and peace* (pp. xx-xx). Routledge. https://www.routledge.com/Social-Innovation-Entrepreneurship-and-Sport-for-Development-and-Peace/McSweeney-Svensson-Hayhurst-Safai/p/book/9781032080628

Kick It Out. (n.d.). *About us*. Kick It Out. https://www.kickitout.org/about-us

Loland, S. (2002). Technology in sport: Three ideal-typical views and their implications. *European Journal of Sport Science*, 2(1), 1–11. https://doi.org/10.1080/17461390200072105

Luczak, T., Burch, R., Lewis, E., Chander, H., & Ball, J. (2020). State-of-the-art review of athletic wearable technology: What 113 strength and conditioning coaches and athletic trainers from the USA said about technology in sports. *International Journal of Sports Science & Coaching, 15*(1), 26-40. https://doi.org/10.1177/1747954119885244

McSweeney, M., Svensson, P. G., Hayhurst, L. M. C., & Safai, P. (2021). Introduction. In M. McSweeney, P. G. Svensson, L. M. C. Hayhurst, & P. Safai (Eds.), *Social innovation, entrepreneurship, and sport for development and peace* (pp. xx-xx). Routledge.

https://www.routledge.com/Social-Innovation-Entrepreneurship-and-Sport-for-Development-and-Peace/McSweeney-Svensson-Hayhurst-Safai/p/book/9781032080628

Miller, T. L., Grimes, M. G., McMullen, J. S., & Vogus, T. J. (2012). Venturing for others with heart and head: How compassion encourages social entrepreneurship. *Academy of Management Review, 37*(4), 616-640. https://doi.org/10.5465/amr.2010.0456

Miragaia, D., & Ferreira, J. J. (2016). Consumer behavior analysis: An innovation approach in nonprofit sports organizations. In V. Ratten & J. J. Ferreira (Eds.), *Sport entrepreneurship and innovation*. Routledge.

Newton, C., Becker, K., & Bell, S. (2014). Learning and development opportunities as a tool for the retention of volunteers: A motivational perspective. *Human Resource Management Journal, 24*(4), 514-530. https://doi.org/10.1111/1748-8583.12040

Norwegian Basketball Federation. (2021, June 4). *Norges Basketballforbund blir regnbuefyrtårn*. Basket. https://www.basket.no/nyheter/2021/norges-basketballforbund-blir-regnbuefyrtarn/

Næss, H. E., & Tjønndal, A. (2021). *Innovation, sustainability and management in motorsports: The case of Formula E*. Palgrave Pivot.

Oracle Red Bull Racing. (2023, July 10). *Oracle Red Bull Racing Esports and Bybit launch athlete development programme*. Red Bull Racing. https://www.redbullracing.com/int-en/oracle-red-bull-racing-esports-bybit-launch-athlete-development-programme

Red Bull. (2023, March 15). *Red Bull Junior Brothers guide: All you need to know*. Red Bull. https://www.redbull.com/us-en/red-bull-junior-brothers-need-to-know-guide

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Free Press.

Scaliza, J. A. A., Jugend, D., Chiappetta Jabbour, C. J., Latan, H., Armellini, F., Twigg, D., Andrade, D. F. (2022). Relationships among organizational culture, open innovation,

innovative ecosystems, and performance of firms: Evidence from an emerging economy context. Journal of Business Research, 140, 264-279. https://doi.org/10.1016/j.jbusres.2021.10.065

Skinner, J., Smith, A. C. J., & Swanson, S. (2018). *Fostering innovative cultures in sport – Leadership, innovation and change*. Palgrave Macmillan.

Solheim, M. C. W. (2022). Making a thousand diverse flowers bloom: Driving innovation through inclusion of diversity in organisations. In B. Callegari, B. A. Misganaw, & S. Sardo (Eds.), *Rethinking the social in innovation and entrepreneurship* (pp. 174-189). Edward Elgar Publishing.

Svensson, D., & Sörlin, S. (2018). The 'physiologization' of skiing: the lab as an obligatory passage point for elite athletes? *Sport in Society*, 22(9), 1574–1588. https://doi.org/10.1080/17430437.2018.1435031

Svensson, P. G., Hancock, M. G., & Hums, M. A. (2017). Elements of capacity in youth development nonprofits: An exploratory study of urban sport for development and peace organizations. *VOLUNTAS: International Journal of Voluntary and Nonprofit Organizations, 28*(5), 2053-2080. https://doi.org/10.1007/s11266-017-9876-7

Svensson, P. G., & Mahoney, T. Q. (2020). Intraorganizational conditions for social innovation in sport for development and peace. *Managing Sport and Leisure, 25*(3), 220-238. https://doi.org/10.1080/23750472.2020.1727358

The Plan. (n.d.). Manchester City builds the first stadium in the metaverse. The Plan. https://www.theplan.it/eng/whats_on/manchester-city-builds-the-first-stadium-in-the-metaverse

Tjønndal, A. (2016). Sport, innovation and strategic management: A systematic literature review. *Brazilian Business Review, 13*(Special Issue), 38-56. https://doi.org/10.15728/edicaoesp.2016.3

Tjønndal, A. (2018a). Sport innovation: Developing a typology. *European Journal for Sport and Society, 14*(4), 291-310. https://doi.org/10.1080/16138171.2017.1421504

Tjønndal, A. (2018b). Vilje til inklusjon – Studier av innovasjon for sosial inkludering i idrett. [Doctoral dissertation, Nord University]. Nord University.

Tjønndal, A. (2021). *Social innovation in sport*. Palgrave Macmillan.

Tjønndal, A. (2023). *Idrettsteknologi*. Fagbokforlaget.

Tjønndal, A. (2024, March 22). Do virtual sports work better for men than women? *Virtual Sports*. https://www.virtualsports.be/2024/03/22/do-virtual-sports-work-better-for-men-than-women/

Trabal, P. (2008). Resistance to technological innovation in elite sport. *International Review for the Sociology of Sport, 43*(3), 313–330. https://doi.org/10.1177/1012690208098255

Wachter-Boettcher, S. (2018). *Technically wrong: Sexist apps, biased algorithms, and other threats of toxic tech*. W. W. Norton & Company.

Walk, M., Zhang, R., & Littlepage, L. (2019). “Don't you want to stay?” The impact of training and recognition as human resource practices on volunteer turnover. *Nonprofit Management and Leadership, 29*(4), 509-527. https://doi.org/10.1002/nml.21344

Welty Peachey, J., Burton, L., Wells, J., & Chung, M. R. (2018). Exploring servant leadership and needs satisfaction in the sport for development and peace context. *Journal of Sport Management, 32*(2), 96-108. https://doi.org/10.1123/jsm.2017-0153

Winand, M., Vos, S., Zintz, T., & Scheerder, J. (2013). Determinants of service innovation: A typology of sports federations. *International Journal of Sport Management and Marketing, 13*(1/2), 55–73. https://doi.org/10.1504/IJSMM.2013.055194

5. Open Innovation Ecosystems: A scoping review and conceptual model for sport management

Canini D., Tjønndal A., and Vicentini F. (Re-submitted after revision II). Open Innovation Ecosystems: A scoping review and conceptual model for sport management. *Managing Sport and Leisure*.

Introduction

Sport organisations rely on collaborative networks to drive innovation in performance enhancement, fan engagement, and digital service delivery. Open Innovation Ecosystems (OIEs) could potentially address the needs for such collaborative networks by pooling resources, shortening innovation cycles, and enabling value creation that no single actor can deliver independently (Adner, 2016; Granstrand & Holgersson, 2020). As sport represents a global industry and a culturally embedded field marked by rapid technological development and diverse stakeholder networks, open innovation and OIEs may be particularly relevant for sport organisations. However, despite sport's global reach and multi-actor innovation practices, research on open innovation and OIEs in sport management remains limited. Current research operationalises the term Open Innovation (OI) in divergent ways and focus on isolated cases (Delshab et al., 2022; Knaus & Merkle, 2020; Wemmer et al., 2016), making it difficult to build cumulative knowledge about how OIEs function in and through sport. While there is a growing body of work on OI in sport management, few studies explicitly adopt an ecosystem lens, leaving questions about structure, governance, and interdependencies across actors underexplored. Consequently, sport managers and policymakers lack integrated evidence to inform strategic decisions, design effective governance structures, and ensure value creation amongst stakeholders.

From this starting point, the purpose of this scoping review is to map current research on OIEs and their relevance for sport management. Specifically, the aim is to: (a) analyse how

OIEs are theoretically conceptualised and their implications for sport, (b) identify key actors and their roles within OIEs in sport, and (c) develop a conceptual OIE model for sport based on the reviewed literature. We chose scoping review methodology because literature on OIEs is emerging and terminologically fragmented. By mapping the field (methods, samples, findings), clarifying key concepts and theoretical frameworks, we will identify knowledge gaps to guide research priorities in sport management.

The subsequent sections are organized as follows: First, we outline the methodological procedures of the scoping review. Second, we present the findings from the review and discuss the theoretical and practical implications. Finally, we propose a conceptual model for OIEs in sport and conclude with recommendations for future research avenues and managerial practice.

Methodology

The main objectives of a scoping review are to assess the breadth and scope of research in an area, summarise research findings and identify gaps in the literature (Arksey & O'Malley, 2005). Our scoping review approach builds on Arksey & O'Malley (2005) and consists of five stages: 1) Identifying the research question; 2) Identifying relevant studies; 3) Study selection; 4) Charting the data; and 5) Collating, summarising and reporting results. We also adopted the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Review (PRISMA-SCR) (Tricco et al., 2018). Situated within a constructivist paradigm, this study employs a qualitative approach to the analysis of the reviewed literature.

Identifying the research question and relevant studies

According to Arksey & O'Malley (2005), the scoping review approach starts by identifying the research aims. These aims should not be overly narrow, as this may constrain the analytical process; rather, they should be broad enough to allow for comprehensive analysis and the

identification of all relevant literature. Consequently, we developed the three aims presented in the introduction.

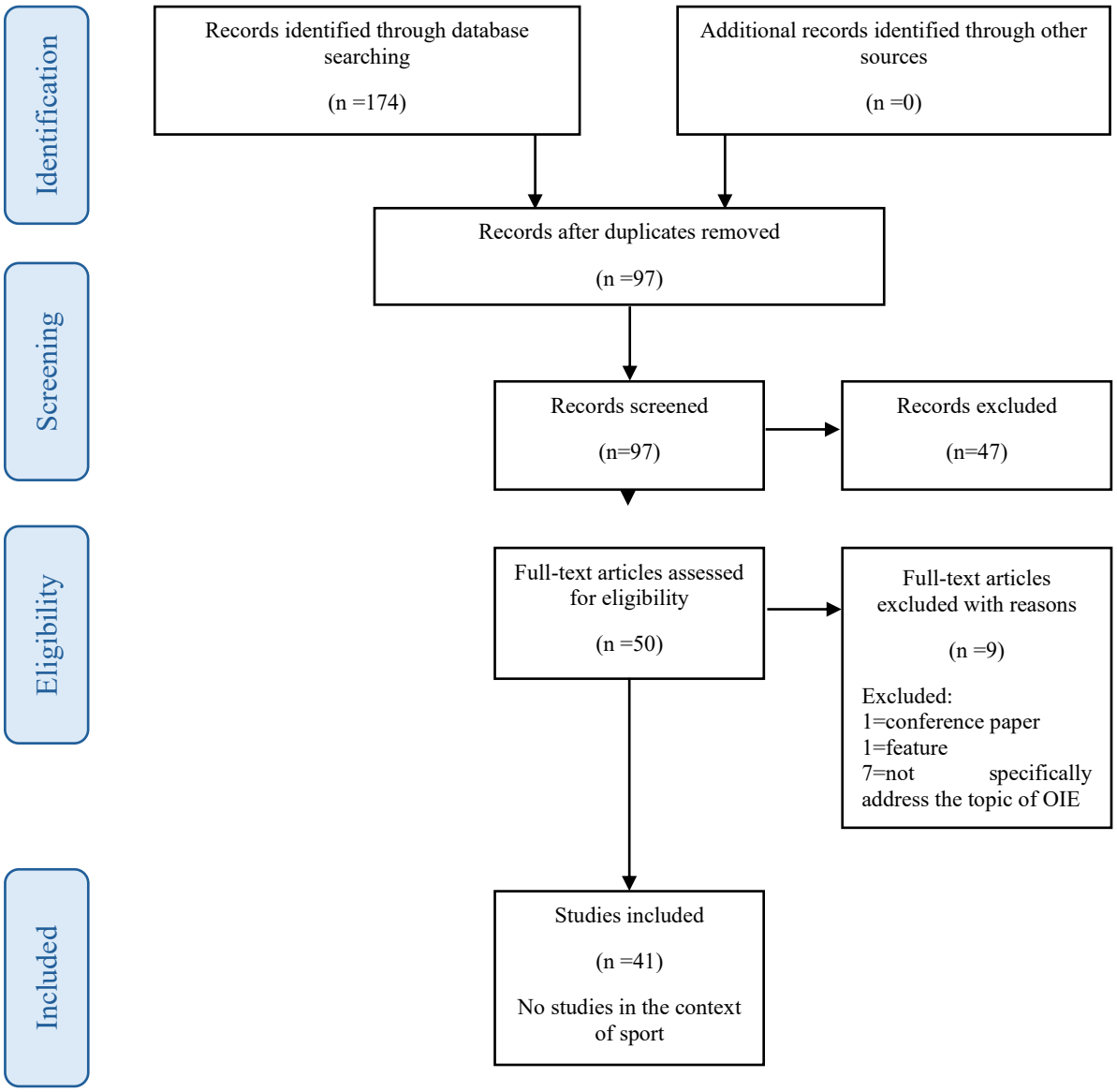
To identify relevant literature on OIEs we utilised three electronic databases (ScienceDirect, Scopus, and Web of Science) between October and November 2024 using the search string: "Open Innovation Ecosystem*" (All-Fields). This produced a total of 1,736 results (ScienceDirect [239], Scopus [1,402], and Web of Science [95]). The decision to use one search string is motivated by the aim to identify a new and rapidly evolving theoretical field. A broader lexical extension would risk confusing the OIEs with related concepts that refer to forms of closed innovation (i.e. innovation ecosystem in general) or occasional collaborations between specific actors based on single project (networks). From the total number of articles, only (a) articles that presented "Open Innovation Ecosystem*" in title, abstract or keywords were chosen as the first inclusion criterion. The search was further restricted by including only (b) articles that were published between 2003 (the year of Chesbrough's theorisation of the open innovation paradigm (Chesbrough, 2003) and 2024, (c) peer-reviewed articles and reviews, and (d) were written in English. This process produced 174 items for further analysis.

Study selection

The 174 articles identified through the three databases were uploaded to Rayyan, an AI-powered review management platform (Ouzzani et al., 2016). After automatic (n=9) and manual (n=68) removal of duplicates, two authors independently read the abstracts to eliminate studies that did not fit our inclusion criteria. Discrepancies were solved through discussion between all authors to make a final decision regarding inclusion or exclusion. This process resulted in the selection of 50 articles for full text review. During this phase, nine articles were excluded: one article was a conference paper, one article was a feature, and seven articles did

not specifically address the topic. The complete list of articles is provided in Appendix 1, while the review process is illustrated in Figure 1.

Figure 1. Flowchart of the review process based on PRISMA-SCR proposed by Tricco et al. (2018).



Charting the data

The fourth stage involved extracting and systematising data from the final sample (41 articles). We organised the data into four main categories using Microsoft Excel: (1) descriptive characteristics, (2) purpose and methodology, (3) results and implications, and (4) OIEs: theoretical and conceptual insights. For *descriptive characteristics* we included authors, title, publication year, keywords, journal, journal's thematic, and SJR classification. *Purpose and methodology* encompasses information about the aim of the study, article type (i.e., empirical/non-empirical), research design (i.e., qualitative/quantitative/mixed methods), methodologies (i.e., case study), industry sector, sector typology (i.e., private, public, non-profit), study location, data collection (i.e., interviews or participatory observation), and analytical approach (i.e., frequency analysis, content analysis). The *results and implications* section charted results, theoretical, managerial and practical implications. Lastly, the *OIE: theoretical and conceptual insights* section included reference models, definitions, conceptualization of the ecosystems, structures, dynamics, key actors involved and their roles, and open innovation strategies adopted.

Collating, summarising and reporting results

According to the fifth step of the Arksey & O'Malley (2005) framework, this phase was structured in two procedures: a quantitative frequency analysis for descriptive purposes and a qualitative content analysis of the main theoretical and conceptual contributions of the studies. The quantitative frequency analysis was used to systematically map the bibliographic and methodological characteristics of the included articles. The journal, the journal's thematic, and SJR classification, methodologies used, industrial sectors considered, organisational level examined and geographical area were analysed. This provided a clear representation of the extent and distribution of literature on OIE. In addition, a qualitative content analysis was

conducted. The qualitative content analysis focused on mapping the definitions of OIE proposed in each study, the actors involved and their roles, the open innovation strategies described, the structures and dynamics of ecosystems, and the main theoretical and practical implications discussed. This qualitative approach made it possible to identify recurring concepts in the literature and map different approaches to how OIE are addressed in research. To ensure transparency and analytical consistency, the content coding was first conducted by one author and then verified by a second member of the research team. The comparison between the two researchers made it possible to consolidate the interpretation of the content and ensure consistency in the categorisation of the topics analysed.

Limitations

Although scoping reviews are effective for mapping and summarising literature on an emerging topic, they have methodological limitations. The categorisation and analysis of the data may be affected by a certain degree of subjectivity, given the complexity and evolution of the OIE concept, despite being based on clear criteria and an independent review process. The use of a single, specific search string, while intentionally selected to focus on the core of the topic, may to some extent omit studies that address the topic using different terminology. Despite these limitations, this study provides a basis for future research on OIEs and its implications for sport management. Finally, as only peer-reviewed studies in English were considered, relevant contributions published in other languages may have been excluded.

Results and Discussion

Defining Open Innovation Ecosystems and their relevance for Sport

Of the 41 studies included in this review, only nine offer a definition of OIE. Although these definitions differ in detail, they share common elements regarding OIE conceptualisation. One common element is the recognition of OIE as interconnected networks of companies and entities that collaborate to foster innovation (Barile et al., 2024; Xie & Wang, 2021). For instance, Barile et al. (2024), describe OIE as a network involving "start-ups, large companies, accelerators, incubators, venture capital, innovation labs, research institutions, and public institutions" that develop relationships to enable OI. Similarly, Xie & Wang (2021) define OIE as "a loosely interconnected network of firms and other entities" in which a substantial number of activities are focused on open innovation.

Another central element is the openness and accessibility of resources within the ecosystem. Alam et al. (2022) highlight this by defining OIE as a "social architecture that allows interdependent firms to access a broader pool of external resources, including knowledge, goods and expertise". The collaborative and co-evolutionary nature of OIEs is third key element. Rohrbeck et al. (2009) describe OIEs as a space where companies work "cooperatively and competitively with other companies in order to co-evolve capabilities, support new products, satisfy customer needs, and incorporate a new round of innovations". Marozzo et al. (2023) add to this, defining OIEs as "the locus where innovations are developed by sharing knowledge, competencies, and capabilities among diverse actors", emphasizing the importance of purposeful network-building and management.

Several definitions introduce the role of a *central orchestrator* in OIEs. Xiong et al. (2022) conceptualize OIEs as "a virtual environment centred around an organizer" that facilitates interactions between innovation seekers and solvers. Similarly, Bacon et al. (2019) and Remneland Wikhamn & Styhre (2023), also notes how certain organisations may serve as "keystones", ensuring effective knowledge exchange and collaboration. These findings indicate that, although there is no universally accepted definition of OIEs, there is consensus

regarding their collaborative and open nature. Some definitions also emphasize orchestration and value creation, positioning OIEs as strategic mechanisms for maintaining long term competitiveness (Marozzo et al., 2023; Rohrbeck et al., 2009; Xiong et al., 2022).

Despite the lack of empirical studies focusing on sport, the identified core elements of OIEs have clear parallels to sport management. For instance, governing bodies or professional sports teams can act as orchestrators, aligning the efforts of sponsors, data analytics providers, and research institutions. This collaborative model reflects ongoing developments in sport technology and in R&D and suggests significant potential for cross sector innovation, where sport organizations can leverage partnerships to improve performance and expand market opportunities using shared expertise and established innovation framework.

To further explore how OIEs are characterised in literature, we conducted a frequency analysis and classified the journals according to the Scimago Journal Rank (SJR) ranking and academic field. Table 1 shows that most of the studies (30 out of 41) are published in Q1 journals, with a strong prevalence of *Journal of Open Innovation: Technology, Market, and Complexity* (14.6%), followed by *R&D Management* and *Journal of Business Research* (9.8% each). The prevailing disciplinary fields are Business, Management, and Accounting (53 records), Social Sciences (17) and Computer Science (12), with smaller contributions from Economics, Econometrics, and Finance (8). This demonstrates that the literature on OIEs has a mainly managerial orientation, while intersecting with technological and social fields. An important finding is the notable absence of studies published in sport management journals (Table 2). Despite the growing importance of innovation in sport, the connection between OIEs and sports management appears to be underdeveloped.

Table 1. Publishing sources and SJR classification.

	Q1	n	Q2	n	Q3	n
	Journal of Open Innovation: Technology, Market, and Complexity	6	Technology Analysis & Strategic Management	2	Electronic Journal of Knowledge Management	1
	R and D Management	4	Applied Sciences	1	Journal of Philanthropy and Marketing	1
	Journal of Business Research	4	Frontiers in Psychology	1		
	California Management Review	3	International Journal of Energy Sector Management	1		
	European Journal of Innovation Management	2	International Journal of Innovation Management	1		
	Sustainability	2	International Journal of Technology Management	1		
	Technological Forecasting and Social Change	2	Journal of Entrepreneurship, Management and Innovation	1		
	Drug Discovery Today	1	Journal of the Knowledge Economy	1		
	European Planning Studies	1				
	Industrial Management and Data Systems	1				
	International Journal of Information Management	1				
	Journal of Engineering and Technology Management	1				
	Journal of Food Science	1				
	Journal of Product Innovation Management	1				
Total		***30***		***9***		***2***

Table 2. Journal's research areas distribution.

	Business, Management and Accounting	**n**	**Social Sciences**	**n**	**Computer Science**	**n**	**Economics, Econometrics and Finance**	**n**
	Business and International Management	8	Development	6	Artificial Intelligence	1	Economics and Econometrics	2
	Business, Management and Accounting (miscellaneous)	4	Law	1	Computer Networks and Communication	4	Economics, Econometrics and Finance (miscellaneous)	6
	Industrial Relations	3	Library and Information Sciences	1	Computer Science Applications	4		
	Management and Information Systems	3	Sociology and Political Science	6	Hardware and Architecture	2		
	Management of Technology and Innovation	12	Geography, Planning and Development	3	Information Systems	1		
	Marketing	6						
	Strategy and Management	16						
	Management and Tourism, Leisure and Hospital Management	1						
Total		***53***		***17***		***12***		***8***

Any value is to be considered out of a total of 119 records identified in the 41 studies included. Other research areas identified: Decision Sciences (n=5), Energy (n=5), Engineering (n=5), Environmental Science (n=4), Phycology (n=3), Chemical Engineering (n=2), Pharmacology, Toxicology and Pharmaceutics (n=2), Agricultural and Biological Sciences (n=1), Material Sciences (n=1), and Physics and Astronomy (n=1).

From a methodological point of view, most of the studies analysed have an empirical approach (85%), with a prevalence of qualitative (73%) over quantitative (15%) and mixed (12%) approaches. The most used methodologies are case-study (33%) and interviews (26%), indicating an exploratory approach that aimed at understanding contextual dynamics of OIE.

Table 3. Studies characteristics.

Article Type	**n**	**Research Methodology**	**n**	**Methodology**	**n**	**Industry Sector**	**n**	**Sector Typology**	**n**	**Study Location**	**n**	**Data Collection**	**n**	**Data Analysis**	**n**
Empirical	35	Qualitative	30	Case Study	23	Multi-Sector	13	Private	21	Europe	22	Documents and Reports	19	Thematic Analysis	25
Theoretical	6	Quantitative	6	Semi-Structured Interviews	12	Manufacturing	5	Public and Private	17	Asia	9	Semi-Structured Interviews	14	Descriptive Analysis	8
		Mixed Method	5	In-Depth Interviews	6	Food Industry	4	Public	3	Global	9	In-Depth Interviews	9	Conceptual Synthesis	5
				Surveys	4	Healthcare	4			North/America	7	Participatory Observation	9	Triangulation	5
				Literature Review	3	Higher Education	4			Oceania	3	Database Research	5	Comparative Analysis	4
				fsQCA	3	Information and Communication Technologies	4			South America	2	Field Observation	5		
												Surveys	5		
Total	***41***		***41***		***69***		***49***		***41***		***52***		***95***		***78***

In terms of industry sectors, 26% of the studies have a multi-sectoral approach (covering three or more areas), while the rest focus on individual sectors such as manufacturing, food, higher education, and ICT. In total, 49 empirical contexts were recorded in the reviewed literature. Notably, none of the studies directly address the context of sport. This gap underlines the need to extend OIE frameworks to sport, where diverse stakeholders could benefit from open, collaborative innovation strategies. At the organisational level, 51% of the studies focus on the private sector, 41% in mixed public-private and 8% in the public entities. Considering that sport often lies at the intersection of public, commercial and non-profit organisations (Shilbury et al., 2016), this highlights the importance of exploring how OIE can be adapted to the sector's specificities. Geographically, nearly half of the studies focus on the European context (42%), followed by global (17%) and Asia (17%), while North America is less represented (13%) despite its leading role in innovation (Table 3).

Understanding Key Elements of Open Innovation Ecosystems

A key element of OIEs involve identifying the actors who shape the ecosystem and their respective roles in creating, implementing and disseminating innovation. The analysis of the reviewed literature (Table 4) identifies eight main categories of actors, each of which can be linked to sport management contexts. The first actor category is *Government and Policymakers*, who provide the regulatory and financial environment necessary for OIEs through targeted policies, funding and infrastructure (Alam & Ansari, 2020; Boeing & Wang, 2021). They also act as facilitators, bringing stakeholders together to legitimise innovations (Randhawa et al., 2024). In the context of sport, government bodies frequently interact with national and international federations (e.g., FIFA, IOC) who regulate events, support investments and promote innovation ecosystems.

A second actor category is *Universities and Research Institutes*. These actors serve as knowledge mediators, offering research and specialised training (Baron, 2021; Fitriasari et al., 2024). Through R&D projects, they generate and transfer technological innovation (Kiseleva et al., 2022), acting as technology transfer hubs (Miller et al., 2016) and facilitate collaboration with industry (Rayna & Striukova, 2014). For instance, collaborations between sports science departments and research centres can contribute to the development of new sports technologies. *Large companies* (third actor category) contribute strategic and financial resources and often act as ecosystems orchestrators supporting OI projects through joint investments and experimentation (Bacon et al., 2020; Marozzo et al., 2023; Rohrbeck et al., 2009; Traitler et al., 2011; Usman & Vanhaverbeke, 2017).

SMEs and Start-ups (fourth actor category) operate in specific niches and rely on co-creation with users to validate new solutions (Bereczki, 2019; Peñarroya-Farell et al., 2023; Radziwon & Bogers, 2019). Some examples from sports start-ups include innovations in VR fan experiences or AI-based performance analysis. However, to do so, SMEs and Start-ups must interact with other actors in the ecosystem (Fallah, 2022).

While governments and large companies fund research and development, a fifth actor category (*Investors and Financial Partners)* provides risk capital and seed funding needed to transition innovations to markets (Alam & Ansari, 2020; Fallah, 2022; Usman & Vanhaverbeke, 2017). The sixth category, *Intermediaries and Knowledge Brokers*, facilitate knowledge transfer and collaboration among ecosystem stakeholders (Almahendra, 2023; McPhillips, 2020; Miller et al., 2016; Vlaisavljevic et al., 2020). This category includes incubators, accelerators, and technology transfer offices, who provide educational and infrastructural support to SMEs and Start-ups (Bereczki, 2019; Fallah, 2022; Ma et al., 2022; Miller et al., 2016).

The seventh actor category is *Technology and Service Providers*, who supply digital infrastructure, tools and platforms needed to manage and integrate ecosystem activities (Boeing & Wang, 2021; Wang et al., 2022; Xie & Wang, 2021). They enable coordination and integration of stakeholders within innovation ecosystems, offering digital platforms for data sharing, collaboration, and strategic decision-making. Finally, *Users and Customers* act as co-creators by providing feedback that shapes product development and influences OIE strategies (Chesbrough et al., 2014; Randhawa et al., 2020; Zhao & Yi, 2023). In sport, fans, athletes, coaches and clubs can guide new technology adoption, providing vital input on fan experience, accessibility, or performance features.

Table 4. Actors involved in the Open Innovation Ecosystem.

Actors	Characteristics	Role in the OIE	Examples from the context of sport
Government and Policymakers	Define policies, regulations and funding for innovations	Create a favourable regulatory and financial environment and encourage public-private collaboration	National and International federations (e.g. FIFA or IOC) or major leagues (e.g. NBA or Premiere League)
Universities and Research Institutions	Produce knowledge, provide training and facilitate technology transfer	Foster R&D with companies, transfer innovation and train new talent	Departments of sports science, sport management or sports technology
Large Companies	Provide strategic, financial and infrastructural resources for the scalability of innovation	Pursue innovation, collaborate with SMEs and Start-ups, finance technology development	Large companies (e.g. Nike or Red Bull) or clubs that have available R&D investments
SMEs and Start-ups	Flexible and dynamic actors, able to develop innovative solutions, collaborate and adapt to the market	Experiment with new solutions, collaborate with Large Companies and participate in co-creation process	Sport tech start-ups
Investors and Financial Partners	Offer capital and investment to support the growth and sustainability of innovations	Support the evolution of the ecosystem with seed funding and long-term investment strategies	Venture capital or private investors
Intermediaries and Knowledge Brokers	Facilitate networking, technology transfer and access to resources for SMEs and Start-ups	Offer infrastructure support, mentoring and facilitate connections between ecosystem players	Incubators, accelerators or technology transfer office
Technology and Service Providers	Provide access to digital infrastructure, technology platforms and IT tools	Provide digital and technology tools for connectivity and innovation management	Established sports tech companies (e.g. Genius Sports)
Users and Customers	Participate in the co-creation and validation of innovations through feedback and adoption	Generate new market needs, validate products and influence OIE strategies	Fans, athletes, coaches, clubs and customers

Having identified the actors and their role within the OIE, we examined the structures and dynamics that support them. The structures describe how the ecosystem is organised, while its dynamics show how actors collaborate, exchange resources and compete. Studying these components together provides insight into how structural configurations enable or constrain innovation. The dynamics of OIEs is characterised by interaction between actors and their joint ability to generate innovation through co-development. These dynamics are based on the combination of co-creation and co-petition. Co-creation is a collaborative approach in which different actors jointly contribute to the design, development and implementation of new solutions (Bereczki, 2019; Randhawa et al., 2020). In OIEs, co-creation is effective when supported by flexible governance models that allow actors to share resources and knowledge without compromising their strategic autonomy (Marozzo et al., 2023; Wang et al., 2022). Co-petition refers to a balance of collaboration and competition between actors (Bacon et al., 2020). Companies may work together to develop new technologies, share infrastructure or access new markets, while maintaining direct competition in the other areas. For example, competing sports teams might collaborate on player welfare initiatives or sports tech solutions, yet remain rivals in fan markets, ticket sales, and championships.

It is evident that OI strategies form the basis of interaction within OIEs, shaping the structures, processes and actor relationships. Historically, the main strategic configurations include *Outside-in*, *Inside-out* and *Coupled* approaches (Gassmann & Enkel, 2004), with the more recent *Outside-out* strategy and the *Inside-in* adding further dimensions. The Outside-in strategy is based on acquiring external knowledge (Mazzola et al., 2012), often mediated by Intermediaries and Knowledge Brokers (Bereczki, 2019; Fallah, 2022). In sport, this takes place as partnerships between clubs or governing bodies and sports tech start-ups to access specialised expertise. The Inside-out strategy involves the enhancement of internal resources to accelerate the diffusion of innovations (Mazzola et al., 2012). It is typical of Large

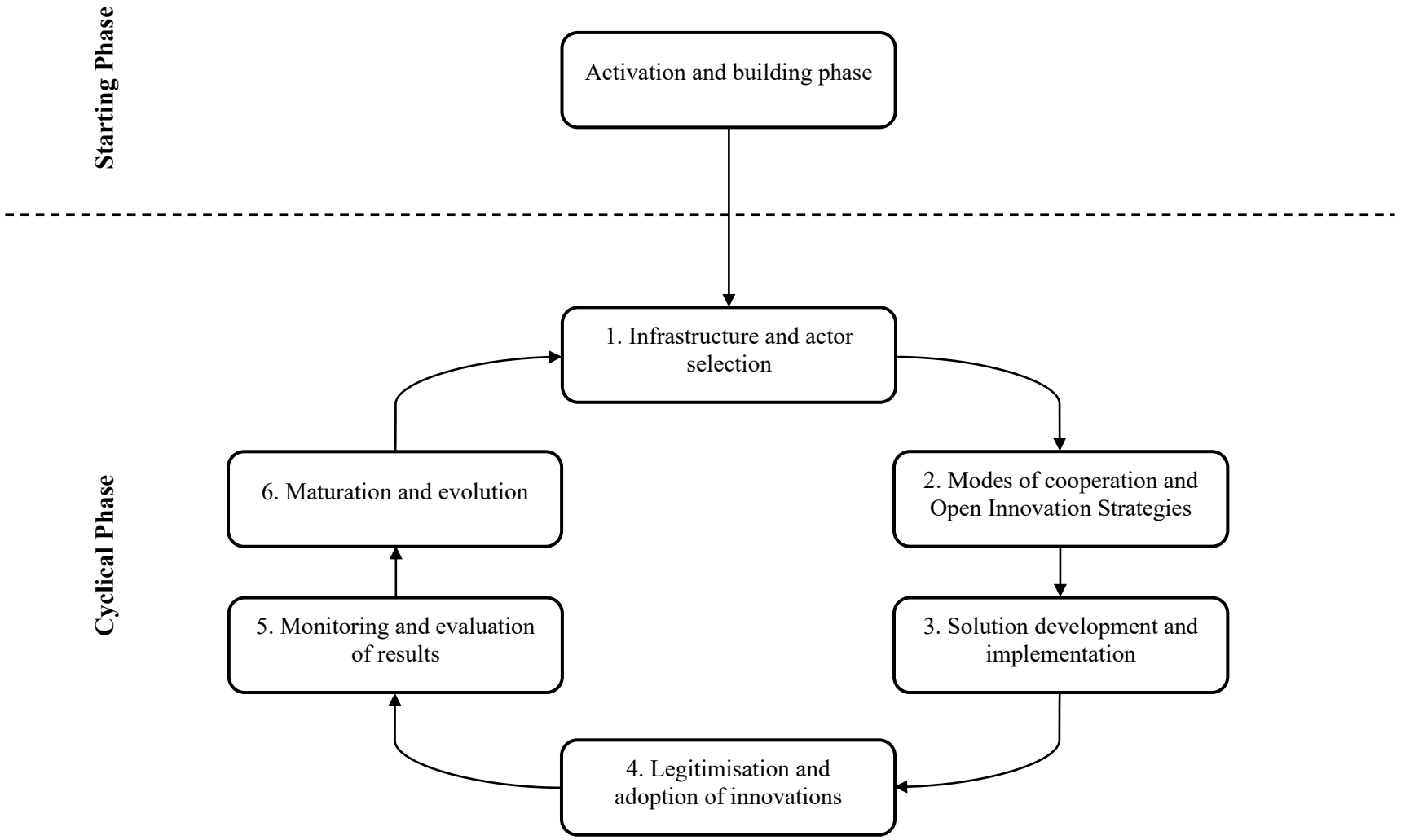
Companies that, acting as orchestrators, leveraging their R&D investments to co-develop within the OIE (Bacon et al., 2020; Rohrbeck et al., 2009).

The Coupled strategy integrates both the previous approaches, allowing companies to combine the acquisition of external knowledge with the sharing of their own innovations, promoting joint development and commercialisation of new solutions (Mazzola et al., 2012). A more recent addition to the OIE strategic landscape is the Outside-out strategy, which focuses knowledge transfer between external entities, without the direct involvement of internal R&D (Gutmann et al., 2023; Randhawa et al., 2024). A sports example of this could be the collaboration between technology providers and federations or league to develop broadcasting solutions while remaining independent entities. In contrast, the Inside-in strategy reflects a closed model based on internal knowledge circulation (Gutmann et al., 2023), which is less relevant in open and ecosystemic contexts.

Developing an Open Innovation Ecosystem Model for Sport

Based on the reviewed literature, we developed a model of OIEs for sport. The model demonstrates how sport organisations can adopt OI principles to foster innovation in areas such as sport performance, fan engagement and organisational competitiveness. The model synthesises insights into the roles of key actors, OI strategies, governance and technology transfer mechanisms (Alam et al., 2022; Randhawa et al., 2024; Rohrbeck et al., 2009; Wang et al., 2022; Xie & Wang, 2021). It consists of two main phases: an activation and building phase and a cyclical phase. The model is presented in Figure 2. In the following discussion, we outline the model using the NBA Bubble as an empirical example.

Figure 2. Open Innovation Ecosystems Model.



Activation and Building Phase

The activation phase establishes the foundation for OIE. It first requires the identification of an orchestrating actor, who assumes an ecosystem leader role. In sport, this role could be played by professional leagues (e.g., the NBA, English Premier League), an international federation (e.g., FIFA, IOC), large sport companies (e.g. Nike, Adidas), or a prominent sport club with strong R&D capabilities. The orchestrator is responsible for defining a shared vision, setting objectives and coordinating the network of actors involved (Barile et al., 2024; Randhawa et al., 2024). For instance, some ecosystems may aim for radical innovations (e.g. new virtual sports formats), while others might adopt a more incremental approach (e.g. refining existing wearable technologies for performance management). At this stage, it is essential to conduct a preliminary assessment of available resources and target groups/markets (Alam et al., 2022). Finally, a regulatory framework must be developed, which is essential for reducing uncertainty and building trust between actors. One example of the activation and building phase can be seen in the case of the NBA Bubble in 2020, where the National Basketball Association (NBA) League took the role of orchestrator. The innovation goal was to create a secure environment that would allow the championship to resume during the COVID-19 pandemic, minimising the risk of contagion and ensuring the continuity of the season (Mack et al., 2023). To achieve this goal, the NBA coordinated a diverse network of actors. This network included state and federal health authorities, large companies (Disney, ESPN, Microsoft), universities and research centres, start-ups specialising in medical devices and wearables, investors, technology and service providers, players (National Basketball Players Association (NBPA)) and fans. Through this network, the NBA mapped and integrated available resources. The league then formalised governance mechanisms by introducing detailed health protocols, data management agreements and risk-sharing clauses. This created the conditions needed for an OIE. Once

activated and structured, an OIE enters a cyclical phase of continuous innovation and adaptation.

Cyclical Phase

In this phase, an OIE follows an iterative and repetitive cycle of development and maturation that allows for continuous innovation processes. This cycle consists of six stages: (1) Infrastructure and actor selection, (2) Modes of cooperation and OI strategies, (3) Solution development and implementation, (4) Legitimisation and adoption of innovations, (5) Monitoring and evaluation of results, and (6) Maturation and evolution (Figure 2).

The building of infrastructure and the actor selection (stage 1) involves the creation of a network of heterogeneous participants with different expertise to ensure a diversity of skills and perspectives. In the case of the NBA Bubble, this involved setting up necessary logistical and digital infrastructure: the Disney World campus as an isolated space, hotels to accommodate teams and staff, venues for games and laboratories for daily testing. At the same time, the NBA selected and coordinated key actors as medical device suppliers, university research centres to validate protocols, broadcaster to provide television coverage and the NBPA to ensure the operational commitment of the players (Mack et al., 2023; Zilber, 2023; Yale University, 2020).

Once actors and infrastructure have been defined, it is essential to establish modes of cooperation and OI strategies (stage 2). In this phase, actors involved, such as Large Companies, Universities and Research Institutes or Intermediaries and Knowledge Brokers, develop joint projects, sharing resources and expertise to maximise the value of innovation (Fallah, 2022; Xie & Wang, 2021). The projects developed can be based on different OI strategies, including Outside-in (e.g. crowdsourcing, venture capital, etc.), Inside-out (e.g. licensing of patent to third parties, creation of company spin-offs, etc.), Coupled (e.g. joint

ventures, co-creation platform with providers and customers, etc.) and Outside-out (e.g. creation of company consortia of technology clusters). The adoption of such strategies depends on the nature of the ecosystem and the needs of the actors involved. In our example, cooperation methods were adopted that reflect different OI strategies. The outside-in strategy was evident in the integration of health technologies developed by start-ups and universities. The coupled strategy involved the co-creation of protocols and guidelines between the NBA, NBPA and health authorities. Finally, an inside-out strategy was evident as the league made its organisational and safety standards available for all the actors involved in the ecosystem (Zilber, 2023; Maney, 2020).

When cooperation arrangements have been established, OIE actors work together to develop and implement innovative solutions (stage 3). This stage includes the co-design of products, services and business model through an iterative approach involving experimentation, pilot testing and continuous validation (Bereczki, 2019; Marozzo et al., 2023; Randhawa et al., 2020). In many cases, the involvement of Users and Customers is essential to ensure that solutions meet market needs (Rohrbeck et al., 2009; Yun et al., 2020). In the case of the NBA Bubble, an innovative solution developed was the digital platform that integrated daily health monitoring of players with real-time reporting systems. Added to this was the involvement of fans through fan engagement experiences as the presence of digital spectators on screens at the sideline of the court (Powell, 2020).

To develop innovations to be adopted on a large scale, organisational, regulatory and cultural barriers that might hinder their diffusion need to be overcome. This legitimisation process (stage 4) requires building consensus among key actors through strategic communication. For instance, innovations in sport frequently require rule adjustments or official approvals from governing bodies (e.g., UEFA, FIFA, or local federations). Public advocacy and strategic communication may work to demonstrate the necessity of these

solutions to fans, sponsors, and policymakers (Randhawa et al., 2024). For our example, legitimacy was developed through alignment with federal health standards, certification of testing protocols and formal recognition by the NBPA and broadcasters. This process helped to consolidate trust of actors involved and ensure acceptance of the rules by players, staff and sponsors (Mack et al., 2023).

To ensure the success of the OIE, it is crucial to evaluate the impact of implemented innovations (stage 5). Continuous monitoring makes it possible to identify critical issues and make improvements in real time. Key Performance Indicators (KPIs) such as broadcast ratings, merchandise sales or injury reduction rates provide useful data to understand the effectiveness of the OIE (Almahendra, 2023; Costa & Moreira, 2022; Rohrbeck et al., 2009). Continuous data collection and comparative analysis against external benchmarks (e.g. rival teams and sport governing bodies) enable evaluation of the ecosystem's positioning in relation to other innovation models (Dianova et al., 2023; Yan et al., 2020). To maximise the benefits of this evaluation process, the implementation of structured feedback loops ensures that the acquired knowledge is integrated into the innovation cycle. This approach contributes to the progressive optimisation of innovation strategies allowing actors to refine their initiatives and enhance the overall value created within the ecosystem (Dianova et al., 2023; Yan et al., 2020). In the case of the NBA Bubble, this phase involved the continuous collection of COVID test data for all the actors involved, daily monitoring of health parameter using smart devices for athletes, and the evaluation of performance indicators as television ratings for broadcaster. The feedback collected made it possible to adapt protocols and progressively improve the organisation of the bubble (Maney, 2020)

The last stage (6) of the cycle relates to maturation and evolution, in which OIEs may stabilise and become a benchmark for innovation in its field. The growth of the ecosystem occurs through the integration of new actors, diversification of activities and expansion of

collaborations (Xie & Wang, 2021). Strengthening the skills of the actors involved and evolving digital and physical infrastructure help to consolidate the system. The long-term sustainability of the OIE depends on its ability to continuously adapt to market changes and emerging opportunities. In our example, the maturation phase resulted in the model's ability to function as an organizational reference for other sporting events during the pandemic. The experience was subsequently replicated or adapted by other leagues (for instance the Women's National Basketball Association and the National Hockey League ("NBA's '20-21 health & safety protocols similar to those in bubble", 2020). At the end of this phase, the cycle restarts, with a re-assessment of the infrastructure, the actors involved, and the strategies adopted, ensuring a continuous and dynamic innovation process regulated by the OIE.

Conclusion

The aim of our scoping review has been three-fold, to: (a) analyse how OIEs are theoretically conceptualised and their implications for sport, (b) identify key actors and their roles within OIEs in sport, and (c) develop a conceptual OIE model for sport based on the reviewed literature. A main finding from the review is that though definitions vary, there is consensus that OIEs are interconnected, open, and collaborative networks emphasising knowledge sharing, orchestration, and co-evolution among diverse actors. These ecosystems rely on shared resources, strategic coordination, and ongoing innovation, making them applicable to sport contexts involving leagues, clubs, technology providers, and governing bodies. Consequently, adopting OIE principles in the context of sport could strengthen multi-actor networks, and generate strategic value across different stakeholders.

Second, OIEs consist of a multitude of actors, including governments, research institutions, large companies, SMEs, investors, intermediaries, technology providers, and end

users. These actors engage in co-creation, co-petition, and strategic collaboration to drive innovation. Their structural and dynamic features centre on digital platforms, governance mechanisms, trust-building, absorptive capacity, and dynamic capabilities, ensuring effective knowledge exchange and balancing openness with competitive advantage. In a sport management context, applying these principles could develop collaboration among governing bodies, clubs, technology providers, and fans, enabling more robust innovation in areas such as performance analytics, event organization, and fan engagement.

Third, we contribute theoretically to innovation literature by developing a conceptual model for OIEs in sport. The proposed model begins with an *activation and building phase*, during which an orchestrating actor is identified, objectives are set, resources and regulatory conditions are clarified. This is followed by a *cyclical phase* that iterates through six stages: (1) selecting infrastructure and actors, (2) determining cooperative modes and OI strategies, (3) co-developing solutions, (4) legitimising and adopting innovations, (5) monitoring and evaluating progress, and (6) guiding the ecosystem toward maturity. By applying these steps and mechanisms, sport organisations can accelerate innovation processes. In this way, our review indicates how OI and OIEs represent a strategic opportunity to innovate business models, develop new technologies and strengthen the competitiveness of sport organisations.

Beyond the theoretical contribution, our research also offers managerial and practical implications for sport organisations. These insights are based on our mapping of the main categories of actors, ecosystem structures, and open innovation strategies that underpin effective OIEs. From a managerial perspective, participating in an OIE requires recognising that collaboration is a gradual process, which is consolidated over time through clear rules and forms of coordination that are useful for managing the diversity of the actors involved. The example of the NBA Bubble discussed in our paper showed how effective ecosystem

management depends on the ability to coordinate partners with different levels of autonomy and experience, using transparent protocols and a clear distribution of responsibilities.

Organisations with limited resources can approach OIE by focusing on collaborations that provide access to expertise, technology and opportunities for experimentation without requiring high investment. The selective and adaptive involvement described in the *cyclical phase*, allows different sport organisations to benefit from the dynamics of the ecosystem while remaining consistent with their own objectives and capabilities. On a practical level, the principles of OIE can translate in targeted partnerships, the shared use of digital platforms or the joint development of services and solutions dedicated to sport's organisational processes. These approaches enable sports organisations to integrate emerging technologies, accelerate digitalisation and improve their business models, avoiding high investment in internal R&D.

Based on our review, future studies can empirically examine the application of our model to better understand the role of sport organisations within OIEs. To validate the model, researchers could use comparative case studies on leagues, federations or clubs, as well as quantitative surveys to identify recurrent patterns in OI strategies and clarify the connections between actors and knowledge flows that characterise OIEs in sport. Looking ahead, research should analyse how geographical, cultural and institutional differences influence OIEs in sport.

Acknowledgment

The authors acknowledge the use of ChatGPT (https://chatgpt.com – version GPT-4o) for text correction and checking of grammatical errors. The prompts used were: (1) Act as an expert academic researcher tasked with correcting grammatical errors in a research paper in the field of Open Innovation. Your task is to analyse the text, identifying any grammatical errors, making corrections to ensure clarity and accuracy. Check the sentence structure, punctuation, consistency of verb tenses and correct use of words; (2) Act as an expert academic researcher

specializing in vocabulary improvement. Your task is to enrich the vocabulary to improve its linguistic quality and readability. Specifically, replace basic or repetitive words with article-related synonyms, improve the overall tone, and ensure that the new words are perfectly consistent with the research context. Provide suggestions for restructuring sentences to improve the flow and clarity of the text.

These suggestions were used to improve the language quality of the article, as neither author is a native English speaker. The authors take full responsibility for the content, as recommended by Committee on Publication Ethics (COPE), while recognizing the use of AI.

Disclosure statement

No potential conflict of interest was reported by the author(s).

References

Adner, R. (2016). Ecosystem as Structure: An Actionable Construct for Strategy. *Journal of Management*, 43(1), 39–58. https://doi.org/10.1177/0149206316678451

Alam, M. A., & Ansari, K. M. (2020). Open innovation ecosystems: toward low-cost wind energy startups. *International Journal of Energy Sector Management*, 14(5), 853–869. https://doi.org/10.1108/IJESM-07-2019-0010

Alam, M. A., Rooney, D., & Taylor, M. (2022). From ego-systems to open innovation ecosystems: A process model of inter-firm openness. *Journal of Product Innovation Management*, 39(2), 177–201. https://doi.org/10.1111/jpim.12615

Almahendra, R. (2023). Disentangling Learning Network Dilemma: A Small-World Effect in a Globalized World. *Sustainability* (Switzerland), 15(3). https://doi.org/10.3390/su15032288

Arksey, H., & O'Malley, L. (2005). Scoping studies: Towards a methodological framework. *International Journal of Social Research Methodology: Theory and Practice*, 8(1), 19–32. https://doi.org/10.1080/1364557032000119616

Bacon, E., Williams, M. D., & Davies, G. (2020). Coopetition in innovation ecosystems: A comparative analysis of knowledge transfer configurations. *Journal of Business Research*, 115, 307–316. https://doi.org/10.1016/j.jbusres.2019.11.005

Bacon, E., Williams, M. D., & Davies, G. H. (2019). Recipes for success: Conditions for knowledge transfer across open innovation ecosystems. *International Journal of Information Management*, 49, 377–387. https://doi.org/10.1016/j.ijinfomgt.2019.07.012

Barile, D., Secundo, G., Garzoni, A., & Fiorentini, A. (2024). Accelerating corporate innovation ecosystems: The exprivia business incubator case study. *Journal of Engineering and Technology Management* - JET-M, 74. https://doi.org/10.1016/j.jengtecman.2024.101845

Baron, M. (2021). Open Innovation Capacity of the Polish Universities. *Journal of the Knowledge Economy*, 12(1), 73–95. https://doi.org/10.1007/s13132-017-0515-8

Bereczki, I. (2019). An open innovation ecosystem from a startup's perspective. *International Journal of Innovation Management*, 23(8). https://doi.org/10.1142/S1363919619400012

Boeing, P., & Wang, Y. (2021). Decoding China's COVID-19 'virus exceptionalism': Community-based digital contact tracing in Wuhan. *R&D Management*, 51(4), 339–351. https://doi.org/10.1111/radm.12464

Chesbrough, H., Kim, S., & Agogino, A. (2014). Chez Panisse: BUILDING AN OPEN INNOVATION ECOSYSTEM. *California Management Review*. http://www.chezpanisse.com/menus/restaurant-menu/.

Chesbrough, H. W. (2003). *Open Innovation: The New Imperative for Creating and Profiting from Technology*. Harvard Business School Press. https://books.google.it/books?id=4hTRWStFhVgC

Costa, J., & Moreira, A. C. (2022). Public Policies, Open Innovation Ecosystems and Innovation Performance. Analysis of the Impact of Funding and Regulations. *Journal of Open Innovation: Technology, Market, and Complexity*, 8(4). https://doi.org/10.3390/joitmc8040210

Delshab, V., Winand, M., Sadeghi Boroujerdi, S., Hoeber, L., & Mahmoudian, A. (2022). The impact of knowledge management on performance in nonprofit sports clubs: the mediating role of attitude toward innovation, open innovation, and innovativeness. *European Sport Management Quarterly*, 22(2), 139–160. https://doi.org/10.1080/16184742.2020.1768572

Dianova, V., Miniero, G., & Suleiman, D. (2023). Towards an open innovation ecosystem in the cultural industry: The bright side of trust and the dark side of measurement. *Journal of Philanthropy and Marketing*, 28(4). https://doi.org/10.1002/nvsm.1784

Fallah, M. R. (2022). Presenting a paradigmatic model for conceptualisation of innovation ecosystem in startups using meta-synthesis approach. *International Journal of Technology Management*, 88(1). https://doi.org/https://doi.org/10.1504/IJTM.2022.121442

Fitriasari, N. S., Sensuse, D. I., Hidayat, D. S., & Purwaningsih, E. H. (2024). A Systematic Literature Review on University Collaboration in Open Innovation: Trends,

Technologies, and Frameworks. *The Electronic Journal of Knowledge Management*, 22(1), 40–58. www.ejkm.com

Gassmann, O., & Enkel, E. (2004). Towards a theory of open innovation: three core process archetypes. *R&D Management Conference*, 6(0), 1–18.

Granstrand, O., & Holgersson, M. (2020). Innovation ecosystems: A conceptual review and a new definition. *Technovation*, 90–91, 102098. https://doi.org/https://doi.org/10.1016/j.technovation.2019.102098

Gutmann, T., Chochoiek, C., & Chesbrough, H. (2023). Extending Open Innovation: Orchestrating Knowledge Flows from Corporate Venture Capital Investments. *California Management Review*, 65(2), 45–70. https://doi.org/10.1177/00081256221147342

Huertas, J. I., Mahlknecht, J., Lozoya-Santos, J. de J., Uribe, S., López-Guajardo, E. A., & Ramirez-Mendoza, R. A. (2021). Campus city project: Challenge living lab for smart cities. *Applied Sciences* (Switzerland), 11(23). https://doi.org/10.3390/app112311085

Kiseleva, O. N., Sysoeva, O. V., Vasina, A. V., & Sysoev, V. V. (2022). Updating the Open Innovation Concept Based on Ecosystem Approach: Regional Aspects. *Journal of Open Innovation: Technology, Market, and Complexity*, 8(2). https://doi.org/10.3390/joitmc8020103

Knaus, D. L., & Merkle, T. (2020). Open Innovation in Sports Management - The Case of the FIFA Museum in Zurich, Switzerland. In *Sport Entrepreneurship: An Economic, Social and Sustainability Perspective* (pp. 43–53). Emerald Group Publishing Ltd. https://doi.org/10.1108/978-1-83982-836-220201008

Ma, Z., Augustijn, K., de Esch, I. J. P., & Bossink, B. (2022). Collaborative university–industry R&D practices supporting the pharmaceutical innovation process: Insights

from a bibliometric review. *Drug Discovery Today*, 27. https://doi.org/https://doi.org/10.1016/j.drudis.2022.05.001

Mack, C. D., Merson, M. H., Sims, L., Maragakis, L. L., Davis, R., Tai, C. G., Meisel, P., Grad, Y. H., Ho, D. D., Anderson, D. J., LeMay, C., & DiFiori, J. (2023). The "Bubble": What Can Be Learned from the National Basketball Association (NBA)'s 2019-20 Season Restart in Orlando during the COVID-19 Pandemic. The journal of applied laboratory medicine, 8(6), 1017–1027. https://doi.org/10.1093/jalm/jfad073

Maney, K. (2020, November 24). *What made the NBA bubble work? Data*. Strategy+Business. https://www.strategy-business.com/blog/What-made-the-NBA-bubble-work-Data

Marozzo, V., Abbate, T., Cesaroni, F., Crupi, A., & Di Minin, A. (2023). Orchestrating an Open Innovation Ecosystem in low-tech industries: the case of Barilla's Blu1877. *Technology Analysis and Strategic Management*. https://doi.org/10.1080/09537325.2023.2222182

Mazzola, E., Bruccoleri, M., & Perrone, G. (2012). The effect of inbound, outbound and coupled innovation on performance. *International Journal of Innovation Management*, 16(6). https://doi.org/10.1142/S1363919612400087

McPhillips, M. (2020). Innovation by proxy – clusters as ecosystems facilitating open innovation. *Journal of Entrepreneurship, Management and Innovation*, 16(3), 101–128. https://doi.org/10.7341/20201634

Miller, K., Mcadam, R., Moffett, S., Alexander, A., & Puthusserry, P. (2016). Knowledge transfer in university quadruple helix ecosystems: An absorptive capacity perspective. *R&D Management*, 46(2), 383–399. https://doi.org/10.1111/radm.12182

NBA's '20-21 health & safety protocols similar to those in bubble. (2020, November 30). Sports Business Journal.

https://www.sportsbusinessjournal.com/Daily/Issues/2020/11/30/Leagues-and-Governing-Bodies/NBA/

Ouzzani, M., Hammady, H., Fedorowicz, Z., & Elmagarmid, A. (2016). Rayyan-a web and mobile app for systematic reviews. *Systematic Reviews*, 5(1). https://doi.org/10.1186/s13643-016-0384-4

Peñarroya-Farell, M., Miralles, F., & Vaziri, M. (2023). Open and sustainable business model innovation: An intention-based perspective from the Spanish cultural firms. *Journal of Open Innovation: Technology, Market, and Complexity*, 9(2). https://doi.org/10.1016/j.joitmc.2023.100036

Powell, S. (2020, August 10). *How virtual fans found their seats at NBA season restart: From digital crowds to pregame intros, home-court energy has reached Orlando*. NBA.com. https://www.nba.com/news/virtual-fans-help-restart-atmosphere

Radziwon, A., & Bogers, M. (2019). Open innovation in SMEs: Exploring inter-organizational relationships in an ecosystem. *Technological Forecasting and Social Change*, 146, 573–587. https://doi.org/10.1016/j.techfore.2018.04.021

Randhawa, K., Vanhaverbeke, W., & Ritala, P. (2024). Legitimizing Digital Technologies in Open Innovation Ecosystems: Overcoming Adoption Barriers in Healthcare. *California Management Review*. https://doi.org/10.1177/00081256241276553

Randhawa, K., West, J., Skellern, K., & Josserand, E. (2020). Evolving a Value Chain to an Open Innovation Ecosystem: Cognitive Engagement of Stakeholders in Customizing Medical Implants. *California Management Review*, 63(2), 101–134. https://doi.org/10.1177/0008125620974435

Rayna, T., & Striukova, L. (2014). University-industry knowledge exchange: An exploratory study of Open Innovation in UK universities. *European Journal of Innovation Management*. http://ssrn.com/abstract=2412632

Remneland Wikhamn, B., & Styhre, A. (2023). Open innovation ecosystem organizing from a process view: a longitudinal study in the making of an innovation hub. *R&D Management*, 53(1), 24–42. https://doi.org/10.1111/radm.12537

Rohrbeck, R., Hölzle, K., & Gemünden, G. H. (2009). Opening up for competitive advantage-How Deutsche Telekom creates an open innovation ecosystem. *R&D Management*, 39(4), 420–430. https://doi.org/https://doi.org/10.1111/j.1467-9310.2009.00568.x

Shilbury, D., O'Boyle, I., & Ferkins, L. (2016). Towards a research agenda in collaborative sport governance. *Sport Management Review*, 19(5), 479–491. https://doi.org/https://doi.org/10.1016/j.smr.2016.04.004

Traitler, H., Watzke, H. J., & Saguy, I. S. (2011). Reinventing R&D in an Open Innovation Ecosystem. *Journal of Food Science*, 76(2). https://doi.org/10.1111/j.1750-3841.2010.01998.x

Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., Moher, D., Peters, M. D. J., Horsley, T., Weeks, L., Hempel, S., Akl, E. A., Chang, C., McGowan, J., Stewart, L., Hartling, L., Aldcroft, A., Wilson, M. G., Garritty, C., … Straus, S. E. (2018). PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. In Annals of Internal Medicine (Vol. 169, Issue 7, pp. 467–473). *American College of Physicians*. https://doi.org/10.7326/M18-0850

Usman, M., & Vanhaverbeke, W. (2017). How start-ups successfully organize and manage open innovation with large companies. *European Journal of Innovation Management*, 20(1), 171–186. https://doi.org/10.1108/EJIM-07-2016-0066

Vlaisavljevic, V., Medina, C. C., & Van Looy, B. (2020). The role of policies and the contribution of cluster agency in the development of biotech open innovation

ecosystem. *Technological Forecasting and Social Change*, 155. https://doi.org/10.1016/j.techfore.2020.119987

Wang, M., Zhang, R., Abdulwase, R., Yan, S., & Muhammad, M. (2022). The Construction of Ecosystem and Collaboration Platform for Enterprise Open Innovation. *Frontiers in Psychology*, 13. https://doi.org/10.3389/fpsyg.2022.935644

Wemmer, F., Emrich, E., & Koenigstorfer, J. (2016). The impact of coopetition-based open innovation on performance in nonprofit sports clubs. *European Sport Management Quarterly*, 16(3), 341–363. https://doi.org/10.1080/16184742.2016.1164735

Xie, X., & Wang, H. (2021). How to bridge the gap between innovation niches and exploratory and exploitative innovations in open innovation ecosystems. *Journal of Business Research*, 124, 299–311. https://doi.org/10.1016/j.jbusres.2020.11.058

Xiong, B., Kuan Lim, E. T., Tan, C. W., Zhao, Z., & Yu, Y. (2022). Towards an evolutionary view of innovation diffusion in open innovation ecosystems. *Industrial Management and Data Systems*, 122(8), 1757–1786. https://doi.org/10.1108/IMDS-11-2021-0686

Yale University. (2020, August 15). *Yale's rapid COVID-19 saliva test receives FDA Emergency Use Authorization*. https://news.yale.edu/2020/08/15/yales-rapid-covid-19-saliva-test-receives-fda-emergency-use-authorization

Yan, H., Wang, L., Yan, X., & Zhai, Q. (2020). Internal and external coordinated open innovation ecosystems: Concept building and applying to Shanghai Zizhu international education park. *Journal of Open Innovation: Technology, Market, and Complexity*, 6(4), 1–13. https://doi.org/10.3390/joitmc6040113

Yun, J. H. J., Park, K. B., Gaudio, G. Del, & Corte, V. Della. (2020). Open innovation ecosystems of restaurants: geographical economics of successful restaurants from three cities. *European Planning Studies*, 28(12), 2348–2367. https://doi.org/10.1080/09654313.2020.1721438

Zhao, W., & Yi, L. (2023). Product innovation logic under the open innovation ecosystem: A case study of Xiaomi (China). *Technology Analysis and Strategic Management*, 35(6), 659–675. https://doi.org/10.1080/09537325.2021.1980208

Zilber, E. (2023). Establishment of the NBA "Bubble" guidelines for the resumption of the 2019–20 season. *Journal of Sports & Entertainment Law*. https://journals.law.harvard.edu/jsel/2023/05/establishment-of-the-nba-bubble-guidelines-for-the-resumption-of-the-2019-20-season/

Appendix

Authors, Year	Title	Journal	DOI
Alam & Ansari, 2020	Open innovation ecosystems: toward low-cost wind energy startups	*International Journal of Energy Sector Management*	https://doi.org/10.1108/IJESM-07-2019-0010
Alam et al., 2022a	From ego-systems to open innovation ecosystems: A process model of inter-firm openness	*Journal of Product Innovation Management*	https://doi.org/10.1111/jpim.12615
Alam et al., 2022b	Measuring Inter-Firm Openness in Innovation Ecosystems	*Journal of Business Research*	https://doi.org/https://doi.org/10.1016/j.jbusres.2021.08.069
Almahendra, 2023	Disentangling Learning Network Dilemma: A Small-World Effect in a Globalized World	*Sustainability*	https://doi.org/10.3390/su15032288
Bacon et al., 2020	Coopetition in innovation ecosystems: A comparative analysis of knowledge transfer configurations	*Journal of Business Research*	https://doi.org/10.1016/j.jbusres.2019.11.005
Bacon et al., 2019	Recipes for success: Conditions for knowledge transfer across open innovation ecosystems	*International Journal of Information Management*	https://doi.org/10.1016/j.ijinfomgt.2019.07.012
Barile et al., 2024	Accelerating corporate innovation ecosystems: The Exprivia business incubator case study	*Journal of Engineering and Technology Management*	https://doi.org/10.1016/j.jengtecman.2024.101845
Baron, 2021	Open Innovation Capacity of the Polish Universities	*Journal of the Knowledge Economy*	https://doi.org/10.1007/s13132-017-0515-8
Bereczki, 2019	An open innovation ecosystem from a startup's perspective	*International Journal of Innovation Management*	https://doi.org/10.1142/S1363919619400012
Boeing & Wang, 2021	Decoding China's COVID-19 'virus exceptionalism': Community-based digital contact tracing in Wuhan	*R and D Management*	https://doi.org/10.1111/radm.12464
Chesbrough et al., 2014	Chez Panisse: BUILDING AN OPEN INNOVATION ECOSYSTEM	*California Management Review*	http://www.chezpanisse.com/menus/restaurant-menu/.
Costa & Moreira, 2022	Public Policies, Open Innovation Ecosystems and Innovation Performance. Analysis of the Impact of Funding and Regulations	*Journal of Open Innovation: Technology, Market, and Complexity*	https://doi.org/10.3390/joitmc8040210
Dianova et al., 2023	Towards an open innovation ecosystem in the cultural industry: The bright side of trust and the dark side of measurement	*Journal of Philanthropy and Marketing*	https://doi.org/10.1002/nvsm.1784
Fallah, 2022	Presenting a paradigmatic model for conceptualisation of innovation ecosystem in startups using meta-synthesis approach	*International Journal of Technology Management*	https://doi.org/https://doi.org/10.1504/IJTM.2022.121442
Fitriasari et al., 2024	A Systematic Literature Review on University Collaboration in Open Innovation: Trends, Technologies, and Frameworks	*The Electronic Journal of Knowledge Management*	www.ejkm.com

Majid Gilani & Faccia, 2022	Broadband Connectivity, Government Policies, and Open Innovation: The Crucial IT Infrastructure Contribution in Scotland	*Journal of Open Innovation: Technology, Market, and Complexity*	https://doi.org/10.3390/joitmc8010001
Huertas et al., 2021	Campus city project: Challenge living lab for smart cities	*Applied Sciences*	https://doi.org/10.3390/app112311085
Kiseleva et al., 2022	Updating the Open Innovation Concept Based on Ecosystem Approach: Regional Aspects	*Journal of Open Innovation: Technology, Market, and Complexity*	https://doi.org/10.3390/joitmc8020103
Ma et al., 2022	Collaborative university–industry R&D practices supporting the pharmaceutical innovation process: Insights from a bibliometric review	*Drug Discovery Today*	https://doi.org/https://doi.org/10.1016/j.drudis.2022.05.001
Marozzo et al., 2023	Orchestrating an Open Innovation Ecosystem in low-tech industries: the case of Barilla's Blu1877	*Technology Analysis and Strategic Management*	https://doi.org/10.1080/09537325.2023.2222182
McPhillips, 2020	Innovation by proxy – clusters as ecosystems facilitating open innovation	*Journal of Entrepreneurship, Management and Innovation*	https://doi.org/10.7341/20201634
Miller et al., 2016	Knowledge transfer in university quadruple helix ecosystems: An absorptive capacity perspective	*R and D Management*	https://doi.org/10.1111/radm.12182
Osorno-Hinojosa et al., 2023	Designing Platforms for Micro and Small Enterprises in Emerging Economies: Sharing Value through Open Innovation	*Sustainability*	https://doi.org/10.3390/su151411460
Peñarroya-Farell et al., 2023	Open and sustainable business model innovation: An intention-based perspective from the Spanish cultural firms	*Journal of Open Innovation: Technology, Market, and Complexity*	https://doi.org/10.1016/j.joitmc.2023.100036
Pikkarainen et al., 2020	Success Factors of Demand-Driven Open Innovation as a Policy Instrument in the Case of the Healthcare Industry	*Journal of Open Innovation: Technology, Market, and Complexity*	https://doi.org/10.3390/joitmc6020039
Radziwon & Bogers, 2019	Open innovation in SMEs: Exploring inter-organizational relationships in an ecosystem	*Technological Forecasting and Social Change*	https://doi.org/10.1016/j.techfore.2018.04.021
Randhawa et al., 2020	Evolving a Value Chain to an Open Innovation Ecosystem: Cognitive Engagement of Stakeholders in Customizing Medical Implants	*California Management Review*	https://doi.org/10.1177/0008125620974435
Randhawa et al., 2024	Legitimizing Digital Technologies in Open Innovation Ecosystems: Overcoming Adoption Barriers in Healthcare	*California Management Review*	https://doi.org/10.1177/00081256241276553
Rayna and Striukova, 2014	University-industry knowledge exchange: An exploratory study of Open Innovation in UK universities	*European Journal of Innovation Management*	http://ssrn.com/abstract=2412632
Remneland Wikhamn and Styhre, 2023	Open innovation ecosystem organizing from a process view: a longitudinal study in the making of an innovation hub	*R and D Management*	https://doi.org/10.1111/radm.12537
Rohrbeck et al., 2009	Opening up for competitive advantage-How Deutsche Telekom creates an open innovation ecosystem	*R and D Management*	https://doi.org/https://doi.org/10.1111/j.1467-9310.2009.00568.x.
Traitler et al., 2011	Reinventing R&D in an Open Innovation Ecosystem	*Journal of Food Science*	https://doi.org/10.1111/j.1750-3841.2010.01998.x

Usman & Vanhaverbeke, 2017	How start-ups successfully organize and manage open innovation with large companies	*European Journal of Innovation Management*	https://doi.org/10.1108/EJIM-07-2016-0066
Vlaisavljevic et al., 2020	The role of policies and the contribution of cluster agency in the development of biotech open innovation ecosystem	*Technological Forecasting and Social Change*	https://doi.org/10.1016/j.techfore.2020.119987
Wang et al., 2022	The Construction of Ecosystem and Collaboration Platform for Enterprise Open Innovation	*Frontiers in Psychology*	https://doi.org/10.3389/fpsyg.2022.935644
Xie & Wang, 2020	How can open innovation ecosystem modes push product innovation forward? An fsQCA analysis	*Journal of Business Research*	https://doi.org/10.1016/j.jbusres.2019.10.011
Xie & Wang, 2021	How to bridge the gap between innovation niches and exploratory and exploitative innovations in open innovation ecosystems	*Journal of Business Research*	https://doi.org/10.1016/j.jbusres.2020.11.058
Xiong et al., 2022	Towards an evolutionary view of innovation diffusion in open innovation ecosystems	*Industrial Management and Data Systems*	https://doi.org/10.1108/IMDS-11-2021-0686
Yan et al., 2020	Internal and external coordinated open innovation ecosystems: Concept building and applying to Shanghai Zizhu international education park	*Journal of Open Innovation: Technology, Market, and Complexity*	https://doi.org/10.3390/joitmc6040113
Yun et al., 2020	Open innovation ecosystems of restaurants: geographical economics of successful restaurants from three cities	*European Planning Studies*	https://doi.org/10.1080/09654313.2020.1721438
Zhao & Li, 2023	Product innovation logic under the open innovation ecosystem: A case study of Xiaomi (China)	*Technology Analysis and Strategic Management*	https://doi.org/10.1080/09537325.2021.1980208

6. Underdogs in the game: How sports start-ups navigate collaboration with external actors

Canini D., Tjønndal A., and Vicentini F. (under review). Underdogs in the game: How sports start-ups navigate collaboration with external actors. *Sport Management Review*.

Introduction

Through their collaborative agility, capacity for rapid experimentation, and delivery of specialized solutions, start-ups have become pivotal drivers of innovation in sport. These qualities also position them as key actors in advancing Open Innovation (OI) (Bereczki, 2019; Usman & Vanhaverbeke, 2017). At its core, OI is grounded in the idea that organizations improve their capacity for innovation by combining internal expertise with knowledge, resources and skills from external actors (Bogers et al., 2017; Chesbrough, 2003). The relevance of OI (and therefore also of start-ups) is further reinforced by the ongoing hybridization of sport (Gammelsæter, 2021; Lucassen & Bakker, 2016). Across international and national contexts, the sport sector progressively spans leisure, health, non-profit organizations, public bodies, commercial enterprises, and professional teams. This hybridity fosters increasingly fluid and interconnected organizational and relational structures, making OI an essential strategic approach for sport organizations seeking to sustain competitive advantage (Author reference A).

Despite these developmental trends, research has not yet sufficiently examined how sports start-ups themselves experience and manage collaborative relationships with other entities. In particular, there is a lack of studies that analyze how sports start-ups experience the relationships with the other actors of the innovation ecosystem, such as universities, policy makers, investors, big companies, sports federations and end-users. Addressing this knowledge gap is essential to advancing open innovation in sport.

For sport innovation research, sports start-ups represent a particularly interesting type of actor because these organizations are forced to learn and adapt quickly to survive and grow (Author reference A). Examining how sports start-ups perceive collaborative opportunities and interactions with external actors offers a first step to identify how organizational learning develops within Open Innovation Ecosystems (OIE) in sport. Furthermore, it addresses a significant knowledge gap on how sports start-ups build their positioning within OIEs, what OI strategies they adopt, which actors they interact with most intensively, and what impacts these choices have. Understanding the role of start-ups in OIEs in sport also means investigating how they balance the need to exploit already acquired resources and skills (exploitation) with that of exploring new opportunities and experiments (exploration), a balance that theoretical literature has identified as crucial in innovation processes (March, 1991; Tushman & O'Reilly III, 1996).

This study aims to analyze how sports start-ups perceive collaborative opportunities and interactions with other actors in their ecosystem. Against this backdrop, the following research question is examined: How do sports start-ups perceive collaborative opportunities and interactions with other actors in their ecosystem? To explore this, we utilize qualitative interviews with executives in sports start-ups in Italy. Theoretically, we draw on literature on start-ups, Open Innovation, Open Innovation Ecosystems, Organizational Learning and Exploration-Exploitation. The article continues with a review of the literature on innovation and start-ups in sport, followed by an outlining of our theoretical framework.

Literature Review: Innovation and Start-Ups in Sport

While there is limited research on how sports start-ups interact with other actors in their innovation ecosystem, there is a substantial body of sport management research on innovation

in sport and on sports start-ups. We draw on both of these research streams in order to examine how sports start-ups engage in collaborative relationships within their innovation ecosystems.

Innovation and Open Innovation in Sport

Innovation has been the subject of increased attention in sport management literature, with studies examining sport innovations from various perspectives. For instance, there is a plethora of studies into different types of sport innovations (Author reference B), such as social innovation (Svensson et al., 2019; Svensson & Hambrick, 2018; McSweeney et al. 2023; Harith et al. 2025), technological innovation (Uhrich, 2021; Harding et al. 2016; Pizzo et al. 2021), organizational innovation (Corthouts et al., 2021), service innovation (Behnam et al. 2020) and open innovation (Wemmer et al. 2016; Delshab et al. 2020; Knaus & Merkle, 2020).

In their study of knowledge management, attitudes towards open innovation and organizational performance of nonprofit sports clubs in Iran, Delshab and colleagues (2020) found that knowledge management could predict nonprofit sports clubs' organizational performance via their attitude toward innovation and innovativeness. In other words, knowledge management enables nonprofit sport organizations to improve their innovative capacity through network building, collaborations and idea sharing. Based on their findings, Delshab et al. (2020) highlights the need for nonprofit sport organizations to put more effort into open innovation strategies. In another study, Wemmer and colleagues (2016) tested the impact of a coopetition-based open innovation approach on organizational performance of nonprofit sports clubs in Germany. Using structural equation modeling, they found that engaging in coopetitive relationships increases nonprofit sports clubs' use of external knowledge, which in turn leads to more implemented innovations and improved organizational performance. Clubs that actively collaborated with commercial fitness centers, educational institutions, other sports clubs, and related organizations benefitted the most in terms of innovation implementation. Therefore, Wemmer et al. (2016) argue that nonprofit sport

organizations should exploit and even expand their organizational boundaries to access diverse knowledge sources. Specifically, Wemmer et al. (2016) describes how digital open innovation platforms and structured collaborations (such as shared staff or volunteer consultants) are valuable tools to facilitate knowledge exchange across and beyond the sports sector, helping clubs identify external expertise and translate it into practical innovations.

While these studies of open innovation in sport have primarily been conducted on nonprofit sport organizations, the broader sport innovation literature examines a variety of empirical contexts, including mega events (Hoff et al., 2023; Hoff & Leopkey, 2025), sport governing bodies (Harris et al. 2020), urban planning (Author reference C) sport businesses (Desbordes, 2001) and sport organizations (Smith & Green, 2020; Author reference D; von Schomberg et al., 2025; Hoeber et al., 2015). In this way, our research contributes to international literature by expanding the range of empirical contexts examined in studies of open innovation in sport specifically, and in sport innovation studies more broadly.

Sports Start-ups

Sports start-ups constitute a newer, and therefore also less developed research field compared to sport innovation. Empirical studies are currently few and thematically diverse. For instance, Jæger's (2019) conducted qualitative interviews with stakeholders in the sport event start-up *Finnmark Race*. Her analysis demonstrates how the establishment and success of the start-up contributed to the creation of new pathways for sport and tourism in northern Norway. Jæger's (2019) findings highlight how sports start-ups in rural areas can become a catalyst for regional development.

Solinas and colleagues (2025) conducted a bibliometric analysis of sports start-ups in Germany and Italy. Their analysis identifies clear national patterns in the literature: German scholarship emphasized interdisciplinary collaboration and integration of sport technology business innovation, and higher education, which manifested in applied entrepreneurship

courses and university innovation labs. By contrast, Italian research was more localized, centering on community-based sports initiatives and regionally funded entrepreneurial education, with a strong focus on experiential learning that connected grassroots sport development to entrepreneurial skill building. A key point from their findings is how academic research and educational practice across Europe shape the emergence of sports start-ups. Together, the findings of Solinas et al. (2025) and Jæger (2019) demonstrate the importance of studying the conditions of sports start-ups in different geosocial contexts.

In another recent study, Gerke et al. (2025) examined the importance of networking and collaborations with incubators for the innovativeness of sports start-ups. In their study, they surveyed fifty start-up firms to examine the role of business incubators on the innovativeness of sports start-ups. Their findings show that while start-up attributes such as size and cohesiveness of strategy positively correlated with reported innovativeness, networking does not necessarily improve the innovativeness of incubated sports start-ups. From these findings Gerke et al. (2025) argue that sector-specific incubators are important for developing start-up innovativeness, along with incubator management.

Theory

Introduced by Chesbrough (2003), OI is based on the idea that companies must integrate external resources, knowledge and skills into their innovation process going beyond traditional organizational boundaries. OI therefore represents a significant change from traditional closed innovation models, promoting interconnection between different actors and fostering mechanisms of collaboration, exchange and co-development (Audretsch et al., 2023; Bogers et al., 2017; Yun et al., 2020). This perspective is particularly relevant in complex and dynamic contexts characterized by institutional hybridity, such as sports ecosystems, which involve public, private and volunteer sectors (Author reference A, Hoff & Leopkey, 2025).

The theoretical shift from a company-centric view to a systemic perspective (Alam et al., 2022) has fostered the development of the concept of Open Innovation Ecosystems (OIE), defined as orchestrated configurations of heterogeneous, interdependent and hierarchically independent actors that gravitate around a central company and co-create value by facilitating innovation through collaborative processes and translational knowledge flows (Thomas & Ritala, 2025). The innovative capacity of the ecosystem depends on its ability to manage knowledge flows, resources, and mechanisms of trust and legitimacy among actors with different institutional logics (Bogers et al., 2017; Audretsch & Belitski, 2023). OIEs are further characterized by interactions between different actors, including big companies, start-ups, public bodies, intermediaries and end users (Author reference A). Hence, these ecosystems differ from traditional networks in terms of their collaboration mechanisms, structured coordination and shared innovation aims (Leydesdorff, 2012; Lappalainen et al., 2023).

Start-ups as actors in Open Innovation Ecosystems

Start-ups play a significant role in OIEs thanks to their ability to act as agile innovators capable of connecting knowledge domains, risk taking and promoting technological and organizational change (Usman and Vanhaverbeke, 2017; Audretsch et al., 2021; Audretsch et al., 2023). However, as companies they face disadvantages related to resource scarcity, lower legitimacy and difficulty in accessing established innovation infrastructures, which are conditions know as *liabilities of newness and smallness* (Albano & Lubello, 2018; Carrasco-Carvajal & García-Pérez-de-Lema, 2022). The adoption of OI strategies can help mitigate these structural disadvantages by enabling start-ups to access external knowledge, build credibility and scale their innovation efforts through strategic alliances (Usman and Vanhaverbeke, 2017; Bereczki, 2019; Lappalainen et al., 2023).

The intensity and variety with which companies adopt these strategies can vary considerably. In research, two concepts have emerged to analytically describe these

differences: breadth and depth (Laursen and Salter, 2006; Ahn et al., 2015). Breadth measures the extent of OI practice adoption, i.e. the number of external sources involved; depth, on the other end, refers to the intensity with which each source is used or integrated into innovation processes. Applied to start-ups, these concepts allow us to understand the complexity of their openness which can range from superficial but broad collaborations to selective but highly deep and integrated partnerships.

From this perspective, the effective use of OI depends on elements such as the ability to navigate the institutional and relation complexity of the ecosystem (Audretsch et al., 2021; Lappalainen et al., 2023), and trust to encourages knowledge sharing, reduces uncertainty and promotes the building of sustainable collaborative relationships (Hasche et al., 2016; Mastrostefano et al., 2020). Despite the centrality of start-ups being recognized in several sectors (West and Bogers, 2013; Chesbrough et al. 2024; Usman and Vanhaverbeke, 2017), in sport there is still a lack of empirical analyses of how these young companies balance breadth and depth and build credibility and legitimacy (Hammerschmidt et al., 2024).

Organizational Learning and Balancing Exploration-Exploitation

Organizational learning describes the processes through which organization acquire, distribute and incorporate knowledge, transforming it into collective practices (Levitt & March, 1988). Within organizational learning, a central concept is the strategic trade-off between exploration and exploitation (March, 1991). Exploration involves experimentation, searching for new opportunities and taking risk, while exploitation focuses on efficiency, refining existing skills and utilizing already available resources (Tushman & O'Reilly III, 1996). Finding a balance between these two approaches and thus developing organizational ambidexterity, has been identified as one of the main strategic challenges for innovative organizations (Tushman & O'Reilly III, 1996). Furthermore, studies have shown that exploration and exploitation are not

static and opposing orientations, but complementary forms of learning that can coexist in open innovation processes (Gupta et al., 2006; Li et al., 2008).

Linking exploration and exploitation to OI, start-ups' collaborations with external actors can be interpreted as mechanisms of organizational learning. Through such collaborations, start-ups have the opportunity to explore new sources of knowledge and, at the same time, exploit to consolidate skills already acquired. Sports start-ups, in particular, are characterized by scarce resources, limited legitimacy and heavy dependence on external partners (Author reference A). Analyzing how these young companies manage the strategic trade-off tension therefore offers a lens for understanding their innovation processes and how they develop and maintain their ability to learn in complex and institutionally hybrid contexts.

Methodology

This study is based on qualitative interviews with executives in sports start-ups. This section elaborates on our sample, the interview protocol and our analytical approach.

Participants

To understand how sports start-ups perceive collaborative opportunities and interactions with other actors in their ecosystem, we conducted qualitative interviews with 15 executives from start-ups in Italy between May and August 2025. Interviewees were selected through purposive sampling (Jones et al., 2013) and included executives directly involved in decision-making processes related to innovation strategy and ecosystem interaction. In addition, interviewees had to be part of start-ups that meet three criteria: (1) represent different stages of development (pre-seed/seed), (2) operate with different business models and (3) belong to a variety of sub-sectors in sport. Recruitment took place through direct contact on LinkedIn or through contacts made at sport-specific events in Italy, as “RiminiWellness – The wellness experience show”.

Table 1 provides an overview of the interviewees and the main characteristics of their start-ups. To ensure anonymity, the interviewees were given pseudonyms. The table shows the date of the interview, the role held within the start-up, the year of foundation, the business model, the stage of development and the sector in which the start-up operates. The role list includes CEO (Chief Executive Officer), responsible for overall strategic direction and management of the company; CFO (Chief Financial Officer), responsible for financial planning and resource allocation; COO (Chief Operating Officer), who supervises operational processes and day-to-day activity; and CTO (Chief Technological Officer), responsible for technological development and product innovation. However, it is important to note that, in the context of start-ups these roles are often fluid due to the limited resources typical of the initial stage. It is common for one person to cover several functions at the same time. The stage of development of the start-ups reflects the level of maturity of the business and available financial resources. Specifically, the Pre-Seed phase refers to an initial stage in which the main aim is to develop a Minimum Viable Product (MVP), validate it on the market and build a solid founding team (EY, 2023). The Seed phase concerns start-ups that have already clearly identified their value proposition and show the first sign of monthly growth. The main aim of this phase is to obtain additional funding to refine the product's market positioning and consolidate the start-up's competitive presence (EY, 2023). Finally, the classification of start-ups into different sectors is based on the taxonomy developed by SportsTechX, an online database specializing in the sports and wellness sector. This classification divides the start-ups into categories based on their target audience: (1) For Athletes – Activity & Performance, (2), For Executives – Management & Organizations, and (3) For Fans – Fans & Content (SportsTechX, 2024).

Table 1. Interviewee details.

ID	Name (fictitious)	Date of the interview	Role	Founded	Business Model	Stage	Sub-Sector
1	Alessio	May 19, 2025	CEO	2022	B2C; B2B2C	Pre-Seed	Fans & Content
2	Lorenzo	May 20, 2025	CEO	2023	B2B; B2C	Pre-Seed	Management & Organization
3	Marco	May 23, 2025	CEO	2023	B2B; B2C; B2B2C	Pre-Seed	Fans & Content
4	Simone	May 23, 2025	CFO	2019	B2B; B2C	Pre-Seed	Fans & Content
5	Beatrice	May 27, 2025	CEO	2023	B2B; B2C	Pre-Seed	Activity & Performance
6	Davide	May 27, 2025	CEO	2021	B2B; B2B2C	Pre-Seed	Fans & Content
7	Gabriele	May 29, 2025	CEO	2016	B2B	Seed	Activity & Performance
8	Paolo	June 05, 2025	CEO	2024	B2B2C	Pre-Seed	Fans & Content
9	Chiara	June 09, 2025	CEO	2023	B2B2C	Pre-Seed	Fans & Content
10	Tommaso	June 09, 2025	COO	2021	B2B2C	Pre-Seed	Activity & Performance
11	Elena	June 19, 2025	CEO	2023	B2C	Pre-Seed	Activity & Performance
12	Alessandra	June 25, 2025	CEO	2021	B2B2C	Seed	Activity & Performance
13	Riccardo	July 14, 2025	CEO	2023	B2B	Pre-Seed	Activity & Performance
14	Stefano	July 23, 2025	CEO	2023	B2B	Pre-Seed	Fans & Content
15	Federico	August 11, 2025	CTO	2019	B2B2C	Pre-Seed	Management & Organization

Procedure

Data collection was conducted through semi-structured interviews carried out online via Microsoft Teams by the first author, with a duration ranging from 25 and 49 minutes. All interviews were transcribed and then translated into English, with attention to terminological and conceptual consistency. The interview explored start-ups' experience with adopting OI strategies and integrating them into ecosystem processes. The interview guide was divided into several thematic areas: after a brief introduction on the role of the interviewee and the organizational context of the start-up, the focus was on the four OI strategies (inside-out, outside-in, coupled, and outside-out), investigating the logic behind their adoption, the balance between the breadth and the depth of collaborations, and the methods of selecting and involving key actors. The interviews continued with a reflection on the main barriers and obstacles encountered in the sport sector. Finally, interviewees were asked to comment on the prospects for evolution of start-ups over the next two to three years and to give advice to someone who wants to develop a sports start-up and collaborate with other innovation ecosystem actors.

Analytical approach

Data analysis followed the four stages of collective qualitative analysis proposed by Eggebø (2020). Immediately after each interview, the first author wrote a short summary memo containing impressions, tone and main themes. After the interview was transcribed and translated, two of the authors read through all the transcription and wrote a short summary of each interview. This process encourages different interpretations of data from the early stages of the analysis. The summaries were then shared and discussed in a collective session in-person. This collective analysis session continued with a joint development of themes before grouping them thematically. The interpretations were then refined in several rounds of collective reading and share writing, ensuring theoretical consistency and analytical rigor (Eggebø, 2020).

This process led to the development of four recurring topics in the data: 1) user-driven innovations and market validation, 2) strategic positioning within the ecosystem: value and limits, 3) navigating power asymmetries and 4) strategic trade-offs, managing bureaucracy and institutional complexity. Following the collective analysis, the first and second author read through the transcriptions of the interview material again, in order to extract quotes and descriptions fitting the four analytical categories chosen to be part of this article.

Findings and Discussion

In the following sections, we discuss the four topics that were developed from our analysis, highlighting how the experiences of sports start-ups shed light on different ways of experiencing collaborations and interactions with other actors. These findings provide empirical evidence on how start-ups navigate collaborative opportunities in their innovation ecosystem.

User-driven innovations and market validation

A first element that reoccurred during the interviews concerns the central role the sports start-up executives attributed to end users. Within the OIE, these actors are considered as crucial sources of co-creation who often drive the innovation processes of start-ups in sport (Author reference A). Although they are often placed at the end of the product cycle, the interviewees emphasized the need to reverse this perspective, placing end users at the center of the development process from the beginning and aligning activities with their needs and expectations:

> "The consumer always comes at the end in the product cycle but in reality, the thought goes on the beginning… everything has to be projected to the consumer." (Alessio)

> "The main players are my customers, the end users; this is because you build a product on them, on their requests, on their needs." (Marco)

The quotes from Alessio and Marco exemplify how direct and continuous interaction with users is an essential condition for fostering rapid and market-driven innovation cycles. This is related to previous research which has highlighted the role of user involvement and service innovation as levers for organizational development (Behnam et al., 2020; Pizzo et al., 2021). Our results extend this evidence to the specific context of sports start-ups, showing how user engagement also works as a mechanism of legitimization for these young companies. Similar patterns have been documented in start-ups across industries beyond sport (Usman & Vanhaverbeke, 2017). In our context, however, this finding highlights how user engagement is crucial to establishing credibility and legitimacy within fragmented ecosystems where reputation often depends on community involvement (Bogers et al., 2017). Another executive added to this, highlighting that:

> "There is close dialogue with the customer, and the relationship with them is fundamental." (Stefano)

Stefano's focus on close interaction with end users can be linked to the concept of breadth in OI. According to Laursen & Salter (2006), the breadth of external sources of knowledge (including end users, customers and communities) is a key driver of the innovative capacity of organizations in general and, in particular, of young companies such as start-ups, for which the search for the Minimum Viable Product (MVP) is a crucial factor for their growth. Along these lines, the interviewees highlight how the strength of a community can sometimes turn into growth opportunities:

> "The user side has worked very well for us; having created a very strong community, many opportunities have arisen from users… If I had to give you a percentage, I'd say 80% comes from the users, from the community's affection for you." (Simone)

The importance of a strong community, as emphasized by Simone, could be interpreted as a dimension of OIEs particularly relevant for start-ups working in specific sub-sectors of sport. Simone's start-up is geared towards fans, an area of sports where end users often engage with great passion and enthusiasm in innovation processes (Winand et al. 2021). Hence, while end users are important to any sports start-up, a strong community of end users might be especially crucial in certain sub-sectors or sport innovation types (Author reference A). Furthermore, many of the interviewees connect end users to their market validation phase. Tommaso described how if he were to give one advice to a new sports start-up it would relate to end users and marked validation:

> "I would definitely start by telling them to identify their target audience, their community, and understand what that community needs, because they will be your customers tomorrow… Another very important thing is to validate, because you need to know if they would pay for that service… So, validating that someone would pay for it is essential, and then you can start from there." (Tommaso)

Another interviewee said that he would give similar advice:

> "Before diving in, you need to gain a better understanding of the market, identifying needs, so your approach is correct." (Davide)

The importance of involving end users in market validation underlines the findings of Audretsch et al. (2023), who emphasize that the relationship between openness and performance is not linear, but depends on the ability of start-ups to test, learn and quickly adapt their business models to the market needs. Hence, it is no coincidence that validation was strongly emphasized

when interviewees were asked what advice they would give to someone who is building their own sports start-up. It could be argued that thorough market validation through the involvement of end users (athletes, coaches, fans, sport organizations) is particularly important for sports start-ups, as sport is a hybrid sector spanning leisure and volunteerism, public services and commercial businesses (Gammelsæter, 2020; Lucassen & Bakker, 2016). Hence, potential customers' willingness to pay for a service or product might be lower than in other sectors such as technology, healthcare or financial services.

The role of users as key drivers of innovation underlines the need to view start-ups as active nodes within a wider network essential to their development. This perspective shifts the focus towards how they build and manage relationships with other actors such as universities, accelerators, investors and large companies to strengthen their market position and enhance their credibility.

Strategic positioning within the ecosystem

In addition to the centrality of users and the community, the interviews reveal the need for sports start-ups to define a clear positioning within the OIE. Collaborations with external entities are useful tools for accelerating growth processes and expanding internal knowledge. As Simone stated:

> "The best way for you to keep up with the times is to embrace open innovation. Not necessarily by acquiring companies, but simply by collaborating. Because if you collaborate with that company without acquiring it, you increase its turnover and improve your processes, which saves you money and is a win-win for everyone." (Simone)

This view aligns with the systemic perspective on OIE, which considers collaboration as an essential mechanism for co-creating and managing knowledge flows (Adner, 2016; Granstrand & Holgersson, 2020). The 'win-win' logic is mentioned by several interviewees and

demonstrates how the start-ups see themselves as providers of specific skills and know-how that can be exploited if integrated with those of large companies and institutional partners:

> "I think the key thing is to find a balance where I, as a start-up, can offer my specific knowledge and skills, and the market and partners can do the same for me." (Chiara)

With this perspective, Alessio pointed out that even the smaller-scale initiatives, such as setting up internships with university students, generate benefit:

> "We are doing a lot of internships, and the students are doing well; so, it's a win-win for us and for the students." (Alessio)

The quotes of Simone, Chiara and Alessio illustrate the crucial role of coupled strategies, in which incoming and outgoing knowledge flows interact to promote mutual learning processes (Gassmann & Enkel, 2004; Randhawa et al., 2024). However, our data also indicates that the sports start-ups have ambivalent experiences of interactions with other actors in their ecosystem. This seemed to be particularly prevalent for universities:

> "Universities are often disconnected from the business world… a lot of theory and little practicality." (Gabriele)

> "Often when universities engage in Open Innovation, they do so only to obtain additional government funding and not with the real aim of doing Open Innovation… Then every now and then something good comes out of it, but it's more of a fluke". (Simone)

These perceptions are in line with open innovation dynamics described by Öberg & Alexander (2019), who highlight how institutional differences and organizational logic can hinder the effectiveness of collaborations. Simone went on to describe how she experienced that the impact of collaborating with a university accelerator was rather marginal:

> "We were an accelerated start-up at [university acceleration programme] but in the end, I'll tell you, 90% you do yourself with the start-up and 10% comes from [university acceleration programme] … So, they play a fairly marginal role from that point of view… I think a start-up needs more." (Simone)

However, Simone's experiences were not echoed by interviewees who collaborated with sport-specific accelerators. Collaborations with sport-specific accelerators were described as stimulating environments, capable of challenging business models while offering important networking opportunities:

> "The accelerator always challenges you; They constantly ask you questions about your business models, your market, your customers… And it creates a network for you". (Davide)

The same executive reported how these programs helped provide useful resources and managerial skills to refine strategy, identifying them as playing fundamental role:

> "Accelerators… provided us with small funds and skills, especially on the business side… useful both for getting to know the partners who are part of the ecosystem and for better focusing our business model". (Chiara)

The positive experiences with sport specific accelerators and the negative experience with general accelerators supports Gerke and colleagues' (2025) recommendation that sector specific entrepreneurial support organizations (such as incubators and accelerators) are important for developing start-up innovativeness. Furthermore, the divergent opinions on the role of accelerators highlight how their contribution largely depends on their ability to offer resources that meet the needs of start-ups. This discontinuity reflects a structural weakness linked to young companies' liability of newness (Albano & Lubello, 2018; Carrasco-Carvajal & García-Pérez-de-Lema, 2022), which make it difficult for sports start-ups to gain credibility and

resources in the initial stage if their development. The liability of newness is also evident when the interviewees describe their collaborations with investors. The role of these actors is described as significant, but at the same time selective:

> "Investors in general, because they look for start-ups that are already up and running; that says it all. If you're not already up and running, it's too much of a leap of faith for them". (Paolo)

> "We spoke with some important investors, and they said, 'Until you have 100,000 users, there aren't any interesting metrics, we can't even make a small investment.' At that point, I think that when you have 100,000 users and significant traction, maybe you don't even need them." (Beatrice)

At the same time, the role of investors is recognized as decisive in the more advanced stages of start-up life cycle:

> Investors become crucial when you need to take your project to the next level (Davide)

Our data demonstrates how access to capital is perceived as a key driver for growing sports start-ups and making them scalable, while simultaneously investors preferer businesses that are already up and running and can demonstrate concrete results through traction (i.e. the measure of interest and validation that a product or service receives from the market). This can add to the results of Gerke et al. (2025) who found that the size of sports start-ups positively correlated with their reported innovativeness, while networking did not necessarily improve the innovativeness of incubated sports start-ups. Hence, start-ups in the seed phase might be more likely to have their networking efforts end in beneficial collaborations with investors.

In summary, collaborations are crucial levers for growth and consolidation, but their effectiveness depends on the quality of the interactions established and the ability to maintain a balance between openness to the outside and the internal development (Bogers et al., 2017; Audretsch & Belitski, 2023). This balance reflects the trade-off between exploration and

exploitation (March, 1991; Li et al., 2008). For many sports start-ups, success depends on being capable of reconciling incremental innovation and more radical innovations (Tushman & O'Reilly III, 1996).

Navigating power asymmetries and strategic trade-off

The trade-off between exploration and exploitation does not only concern internal development choices but is also reflected in collaborative dynamics with other actors in the ecosystem. In managing these relationships, tensions and power asymmetries often arise, affecting the ability of start-ups to purse OI strategies effectively. While all the participants described collaborating with other actors in their ecosystem as crucial for the success of their start-up, for most of them their collaborative efforts were characterized by tensions and difficulties. A recurring sentiment among the participants was that as a start-up there was always a need to initiate collaboration with other actors in the ecosystem:

> "It is always you who seeks or proposes to others. In 99.9% of cases, this is always the case… if you don't insist, promote, organize and orchestrate everything, it's impossible." (Simone)

The pressure of always being the actor seeking and initiating collaboration was something that Elena attributed to the size and novelty of start-ups:

> "When you're a start-up nobody knows you, and that's the hard part. So, you can collaborate, but only on a small scale" (Elena)

Similarly to Elena, Davide also recognized the challenges of adapting to other actors, while simultaneously highlighting how the ability to do so is a strength of start-ups:

> It's challenging to adapt what you're doing to requests that often come from outside, like companies, especially medium to large corporations. But in this sense, the strength of a

> start-up lies in its agility, its ability to move and change course or change its product very easily." (Davide)

Agility, risk taking and capacity for experimentation are all features that Audretsch et al. (2021; 2023) describe as strengths of start-ups in an OIE. As highlighted by Simone and Davide, these dynamics can also be related to the intensity and variety of collaborations with other ecosystem actors, what Laursen & Salter (2006) describe as breadth and depth of OI strategies (see also Ahn et al., 2015). From the experiences of Simone and Davide it seems that start-ups are often dependent on cultivating strategic relationships with a variety of actors (breadth). In the interview, Davide went on to describe how engaging with high intensity (depth) with one external actor, especially companies, came with risks for start-ups:

> "You need to be careful here because some companies collaborate and others prefer to do things independently, the "buy-it or made-it" concept, so you need to be careful." (Davide)

This tension between breadth and depth reflects what March (1991) described as the strategic balance between exploration and exploitation. This balance seems to be even more important for sports start-ups, which constantly assess whether to diversify their relationships in search of new opportunities or to deepen selected partnerships to consolidate trust and resources. Our findings suggest that this equilibrium is more difficult to achieve because of power asymmetries limit start-ups' ability to freely shape their collaboration choices. Several of the interviewees had negative experiences of engaging in intensive collaborations (depth) with companies, as they felt that larger, more established companies were trying to take advantage of them. Two examples came from Riccardo and Simone:

> "[name of company], the only thing they could say was… "We're buying 100% of [name of start-up], we're going to make it disappear and you [interviewee] will remain an employee for two years", they could have said, "We're going to incubate it, we're going to

> do a joint venture with [interviewee], who is the head of this unit in that brand". But no, they make you an employee for two years, bound by the know-how; you can't do anything else in the sector for the next five years, but it's the sector I want to work in." (Riccardo)
>
> "We still did some really interesting things and did them well, achieving numbers that the [name of company] had never achieved before, and then the following year they disappeared and came back with a service that was designed to be our direct competitor. So, this gives you an idea of the situation." (Simone)

These examples from our data demonstrate some of the structural disadvantages that sports start-ups face in their interactions with other actors in their ecosystems (Albano & Lubello, 2018). These disadvantages related to the resource scarcity, lower legitimacy and difficulty in accessing established innovation infrastructures (Carrasco-Carvajal & García-Pérez-de-Lema, 2022). The quotes of Riccardo and Simone also suggest that there is a lack of a shared innovation aim in the strategic interactions between sports start-ups and companies (Leydesdorff, 2012; Lappalainen et al., 2013). From our data, it is clear that these disadvantages impact both the strategic interactions that sports start-ups engage in with other actors, as well as their trust towards big companies and other ecosystem actors (Bogers et al., 2017; Audretsch & Belitski, 2023). However, these issues of trust between sports start-ups and other actors may not be universal but vary between national sport contexts and cultures across Europe and other regions of the world. For instance, Jæger's (2019) study illustrates collaborations between sports start-ups and big companies characterized by high degrees of trust and mutual collaboration. Similarly, Solinas et al. (2025) identified contextual differences between the ecosystems of sports start-ups in Germany and Italy.

The interviewees in our sample develop adaptive strategies to protect their autonomy

and knowledge in their unbalanced interactions with big companies in their ecosystem: they learn from failed collaborations, reconfigure their networks and adapt their approach to partnerships as they develop. In this sense, organizational learning becomes a necessary mechanism for dealing with uncertainty and navigating the institutional and relation complexity of sport. Furthermore, the start-ups in our sample indicated that these disadvantages extended to their interactions with a broader range of ecosystem actors, including accelerators, public sector sport federations, and investors:

> "We initially approached an accelerator. But we realized that they didn't favor start-ups but rather harmed them. We realized that what they were asking for was too much. For example, they wanted to join the start-up with equity, but with a significant stake in the start-up; they even asked us to contribute money in order to have access to consulting services. This did not bring us any value, so we decided not to go ahead". (Federico)

> "I found some unacceptable clauses. We had a meeting where I tried to negotiate; we managed to agree on a few things, but I always felt that something was wrong. On the other side, there was this attitude of "Well, we're [name of sport federation] you have to accept anything because you're just a small start-up", and I honestly didn't agree". (Chiara)

> "There are many who present themselves as investors, but in reality, when you talk to them, they want to give you between €1,000 and €5,000… The reality is that most of them don't want to give you money without telling you why, and that's the worst thing". (Davide)

These experiences of power asymmetries in the start-up's interactions and collaborations with other actors, shows how OIEs are still fragmented and underdeveloped in sport (Author reference A). OIEs are said to be characterized by hierarchically independent actors who co-create through collaborative processes and translational knowledge flows (Thomas & Ritala,

2025). In the experiences of Chiara, Federico, Riccardo and Simone, other actors do not appear to consider sports start-ups as equal partners or hierarchically independent of them. As highlighted through our material, the precariousness and disadvantages of being a "small" actor in the ecosystem is prominent in our findings. However, some of the interviewees expressed their efforts to resist the pressures of other actors:

> "To be a start-up does not mean that I have to accept anything you offer me just because we are small and inexperienced". (Chiara)

This sentiment reflects the dual nature of exploration and exploitation. While start-ups engage in exploration to diversify opportunities and reduce dependence on dominant actors in order to establish their autonomy, they also rely on the exploitation of consolidated collaborations to secure legitimacy and resources. Interviewees also explained how achieving this balance is particularly difficult due to navigating bureaucratic structures and institutional complexity, factors that further shaped their strategic decisions and interactions.

Managing bureaucracy and institutional complexity

As discussed by Albano & Lubello (2018) and Carrasco-Carvajal & García-Pérez-de-Lema (2022) OI and its impact on start-ups' performance and development depend on the institutional environment. Within the Italian context, it became clear from our material that the institutional environment of sports required the participants to manage complex bureaucratic processes at multiple levels. According to our material, the institutional complexities of public bodies in particular, result in tensions that the start-ups must manage in order to grow:

> "On the partnership side we sometimes had problems, especially in terms of timing and pace… we really struggle with the public side… We detached ourselves strongly from public entities for funding or others because we go at a very odd speed… We have won grants; 'within 30 days the transfer', then if it arrives after 120 days it is an incredible

> damage because you rely on those grants… as soon as we realized that the modus operandi was that the timing was that we deviated a little… The public body is sometimes not very interested in helping start-ups… the bureaucracy prevents you from doing anything". (Alessio)

> "We're encountering many problems with the timing of receiving the funds we've won. We were informed at the end of January that we had won the prize for this event, but there are a series of bureaucratic obstacles that are lengthening the process considerably. We were supposed to receive the prize by March, and it's now June, so from this point of view, there are many problems." (Chiara)

> "Public bodies? They are very slow. That's the problem with start-ups: you have a very short life cycle, and if you miss that window because you have to chase after these players who can make you lose six months or even a year, you can say "bye-bye" to your project". (Tommaso)

These quotes illustrate how bureaucratic delays limit the ability of sports start-ups to exploit existing opportunities, forcing them to seek alternative partnerships and financing mechanisms. Previous studies have shown how institutional logics and bureaucratic structures influence innovation processes in sport (Wemmer et al., 2016; Delshab et al., 2020). Our findings extend these insights to the case of sports start-ups, recognizing institutional complexity as a source of slowing innovation processes, capable of influencing strategic trade-off in interactions with other actors. As noted by Tommaso, misaligned institutional timelines directly affect survival and innovation capacity, making it crucial to find a balance between exploration and exploitation. While all the start-ups in our sample describe how public funds are important for their survival, the issues of timing and pace are detrimental. These institutional differences serve to weaken the legitimacy of public bodies amongst the participants (Bogers et al., 2017;

Audretsch & Belitski, 2023), as exemplified in the quotes above from Alessio, Chiara and Tommaso.

Challenges of managing bureaucracy also extends beyond the start-up's interactions with public bodies, as many of the interviewees said that long and complex bureaucratic processes where persistent also in their collaborations with other actors, such as companies and universities:

> "Whether it's a corporation or a public body, becomes difficult because they are stuck in bureaucracy, which we start-ups don't have… they may not realize how complex it can be to develop things specifically for them. Sometimes they demand a lot but give little in return". (Alessandra)

> "It's always difficult to talk to external companies and agencies because they don't understand that a start-up has certain objectives with certain deadlines and certain budgets. So, it's always a bit difficult to work with an agency if you're a start-up; it's very different from being an established company with other budgets". (Davide)

Awareness of these situations forces start-ups to adapt their strategies by trying to anticipate delays and prioritizing partnerships with more responsive actors. In this way, sports start-ups must progressively reconfigure their networks to achieve autonomy and learn to manage institutional complexity over time. In line with the observations of Albano & Lubello (2018) and Carrasco-Carvajal & García-Pérez-de-Lema (2022), our findings suggest that the bureaucratic inertia described by participants is not confined to the public sector. Rather, it permeates a variety of ecosystem relationships, including those with corporations, agencies, and universities, which are all key actors in OIEs. The recurring descriptors of "old mentality," "slow process," and "stuck in bureaucracy" reflect entrenched institutional logics that are resistant to the temporal demands and iterative practices of sports start-ups. From the interviewees' perspective, these bureaucratic hurdles translate into transaction costs that exceed

what their resource-constrained operations can absorb. As Davide noted, agencies and corporations struggle to understand the organizational and institutional realities of start-ups, illustrating a goal misalignment that echoes findings from Hasche et al. (2016) on the fragility of trust in OI arrangements. In these conditions, delays jeopardize the commercial viability of innovation projects, particularly given the short life cycles and narrow market windows characteristic of sports start-ups. Accounts of the participants' interactions with universities and companies add further layers to the institutional complexity and bureaucracy that start-ups must manage. For instance, Marco explained how they felt that universities "live in a world of their own":

> "The mentality is still old and the bureaucracy is so slow that it slows down the whole process… if it takes me a week to do something with my company, it took me six months at university and it's not possible because business is fast (...) the university lives in a world of its own and this is what slows down the whole innovation process". (Marco)

Similar to universities and public bodies, some participants explained how similar bureaucracy was present in companies. Davide described that even when large companies demonstrated interest in OI and collaboration with their start-up, there seemed to be a lack of motivation, resources, and internal know-how to translate this intent into outcomes:

> "We also started with another large company… I would say that the main problems were time, but above all motivation… we basically wasted four months of time on nothing… The companies we have encountered on our journey have shown a great deal of interest in Open Innovation managers… But then we realize that there is no corporate mindset to support Open Innovation… Open Innovation does not have the importance that I believe it should have at company level (...) Corporations have so many other commitments and so many other activities to carry out for their core business that… they want to do certain

> projects but don't have the staff to do so… they also lack the internal know-how to create something technological". (Davide)

These findings further illustrate how sports start-ups learn and make selective choices in managing collaborations, focusing on partnerships with actors perceived as more agile and strategically aligned. This behavior highlights the role of strategic trade-off. In addition to exploring new ways to bypass rigid institutional constraints, start-ups must exploit trusted relationships that provide them legitimacy and reliable access to resources to avoid "saying bye-bye" to their project.

Collectively, these experiences portray the institutional environment as a structural bottleneck that sports start-ups must either manage and strategically navigate or circumvent by limiting their interactions with other key actors in their ecosystem. By developing adaptive learning processes, sports start-ups progressively strengthen their ability to manage institutional complexity creating dynamic capabilities that support innovation despite resource constraints and bureaucratic inertia.

Conclusion

The aim of the article was to understand how sports start-ups perceive collaborative opportunities and interactions with other actors in their ecosystem. Central to our findings is the notion that engaging in collaboration is both necessary and risky for sports start-ups. Our findings show that the sports start-ups constantly have to manage power asymmetries, bureaucratic and institutional complexities in their interactions with investors, universities, accelerators, public agencies and large companies. Collaborations therefore appear ambivalent. While they are crucial to access resources, skills and legitimacy, they are also a source of

vulnerability when the relationship with an external actor is unbalanced or slowed down by institutional complexities that are incompatible with the rapid pace of start-ups.

Two striking examples of such ambivalences relate to collaborations with large companies and interactions with public bodies. For sports start-ups, partnerships with large companies drive growth yet require caution, as larger firms often attempt to buy them out or even steal their business ideas. Another example of such ambiguity relates to the start-ups' interactions with public bodies. Most start-ups are dependent on funding from public bodies through grants. Whilst the sports start-ups in our sample considered such grant opportunities as important, the interviews show how the bureaucracy of public bodies diminishes the practical value of such funding. Here, complex applications and slow payout processes are key issues.

These results offer a significant theoretical contribution to the debate on OIE in sport. In line with the perspective of March (1991) and Tushman & O'Reilly III (1996), the study shows how balancing the breadth and depth of collaborations (Laursen & Salter, 2006; Ahn et al., 2015), as well as between exploration and exploitation, is a process influenced by the peripheral position that sports start-ups occupy in fragmented ecosystems. While literature has emphasized the role of start-ups as agile actors capable of generating innovation (Usman & Vanhaverbeke, 2017; Audretsch et al., 2021; Audretsch et al., 2023), our findings show that this potential can only be activated when start-ups develop organizational learning capabilities and adaptation strategies to handle asymmetrical and institutionally complex relationships. Furthermore, our study extends research on innovation processes in sport by examining the perspective of start-ups, an empirical context that has received limited scholarly attention.

From a practical and managerial point of view, the findings demonstrate the importance of greater strategic awareness from all actors in the sports' OIE. For start-ups, this implies the ability to select and manage partners to reduce the risks of dependence on more powerful actors

without scarifying the flexibility needed to look for new opportunities. For investors, large companies, universities and public institutions, the results show the need to move beyond opportunistic and bureaucratic approaches in favor of fair and sustainable co-creation processes (Adner, 2016; Granstrand & Holgersson, 2020). Reducing bureaucracy and creating specific programs for the sports sector can be a key lever for strengthening the ecosystem. Furthermore, the evidence collected contributes to current research on sports start-ups by offering new empirical perspectives on the issues of legitimization, networking and forms of entrepreneurial support in sports contexts (Jæger, 2019; Solinas et al., 2025; Gerke et al., 2025).

Looking ahead, the experiences of the sports start-ups executives in our sample illustrate the need for a nuanced understanding of the role of start-ups in open innovation ecosystems, especially across different geosocial contexts. Therefore, the implications of this research extend beyond the specifics of the national context of our data. It prompts a broader consideration of how sports start-ups view the potentials and pitfalls of engaging in collaboration with other ecosystem actors. We hope that this study will stimulate academic interest in exploring these dynamics in international contexts and in relation to other actors in the ecosystem. This may offer interesting opportunities for theoretical as well as empirical comparisons in sport management and sociology of sport, building a more comprehensive and multi-level understanding of OI processes in sport.

Acknowledgment

The authors acknowledge the use of ChatGPT (https://chatgpt.com – version GPT-5) and Microsoft Copilot GPT5 for text correction and checking of grammatical errors. The prompts applied were designed to: (1) correct grammatical errors, sentence structure, punctuation, and

verb tense consistency; and (2) enhance vocabulary and readability by suggesting more precise, context-appropriate terms and replace repetitive words.

These suggestions were used to improve the language quality of the article, as neither author is a native English speaker. The authors take full responsibility for the content, as recommended by Committee on Publication Ethics (COPE), while recognizing the use of AI.

Disclosure statement

No potential conflict of interest was reported by the author(s).

References

Adner, R. (2016). Ecosystem as Structure: An Actionable Construct for Strategy. *Journal of Management*, 43(1), 39–58. https://doi.org/10.1177/0149206316678451

Ahn, J. M., Minshall, T., & Mortara, L. (2015). Open innovation: A new classification and its impact on firm performance in innovative SMEs. *Journal of Innovation Management*, 3(2), 33–54.

Alam, M. A., Rooney, D., & Taylor, M. (2022). From ego-systems to open innovation ecosystems: A process model of inter-firm openness. *Journal of Product Innovation Management*, 39(2), 177-201. https://doi.org/10.1111/jpim.12615

Albano, V. G., & Lubello, F. (2018). How start-ups overcome their liabilities: Emerging topics and future research paths. *Sinergie Italian Journal of Management*, 36(106), 33–50. https://doi.org/10.7433/s106.2018.03

Audretsch, B. D., & Belitski, M. (2022). The limits to open innovation and its impact on innovation performance. *Technovation*, 119, 102519. https://doi.org/10.1016/j.technovation.2022.102519

Audretsch, D. B., Belitski, M., Caiazza, R., & Siegel, D. (2023). Effects of open innovation in startups: Theory and evidence. *Technological Forecasting and Social Change*, 194. https://doi.org/10.1016/j.techfore.2023.122694

Audretsch, D. B., Lehmann, E. E., & Seitz, N. (2021). Start-ups, innovation and knowledge spillovers. *Small Business Economics*, 56, 723–735. https://doi.org/10.1007/s11187-019-00250-9

Behnam, M., Delshab, V., & Tuan, L. T. (2020). Perceived service innovation in non-profit sports clubs: the antecedents and consequence. *European Sport Management Quarterly*, 22(3), 440–462. https://doi.org/10.1080/16184742.2020.1799051

Bereczki, I. (2019). An open innovation ecosystem from a startup's perspective. International *Journal of Innovation Management*, 23(8). https://doi.org/10.1142/S1363919619400012

Bogers, M., Zobel, A. K., Afuah, A., Almirall, E., Brunswicker, S., Dahlander, L., Frederiksen, L., Gawer, A., Gruber, M., Haefliger, S., Hagedoorn, J., Hilgers, D., Laursen, K., Magnusson, M. G., Majchrzak, A., McCarthy, I. P., Moeslein, K. M., Nambisan, S., Piller, F. T., … Ter Wal, A. L. J. (2017). The open innovation research landscape: established perspectives and emerging themes across different levels of analysis. *Industry and Innovation*, 24(1), 8–40. https://doi.org/10.1080/13662716.2016.1240068

Carrasco-Carvajal, C., & García-Pérez-de-Lema, D. (2022). Measuring open innovation in SMEs: An overview of current research. *Sustainability*, 14(5), 2854. https://doi.org/10.3390/su14052854

Chesbrough, H. W. (2003). *Open Innovation: The New Imperative for Creating and Profiting from Technology*. Harvard Business School Press. https://books.google.it/books?id=4hTRWStFhVgC

Chesbrough, H. W., Radziwon, A., Vanhaverbeke, W., & West, J. (Eds.). (2024). *The Oxford Handbook of Open Innovation*. Oxford University Press.

Corthouts, J., Winand, M., & Scheerder, J. (2023). A three-dimensional model of innovation within Flemish non-profit sports organisations. *European Sport Management Quarterly*, 23(3), 853–876. https://doi.org/10.1080/16184742.2021.1936115

Delshab, V., Winand, M., Sadeghi Boroujerdi, S., Hoeber, L., & Mahmoudian, A. (2022). The impact of knowledge management on performance in nonprofit sports clubs: the mediating role of attitude toward innovation, open innovation, and innovativeness. *European Sport Management Quarterly*, 22(2), 139–160. https://doi.org/10.1080/16184742.2020.1768572

Desbordes, M. (2001). Innovation management in the sports industry: Lessons from the Salomon case. *European Sport Management Quarterly*, 1(2), 124–149. https://doi.org/10.1080/16184740108721892

Eggebø, H. (2020). Collective qualitative analysis: Methodological reflections from a team-based research project. *Qualitative Research*, 20(4), 512–528. https://doi.org/10.1177/1468794119884804

EY. (2023). EY Venture Capital Barometer 2022: Italia. EY Strategy and Transactions. https://www.ripartelitalia.it/wp-content/uploads/2024/01/ey-vc-barometer-2023.pdf

Gammelsæter, H. (2021). Sport is not industry: bringing sport back to sport management. *European Sport Management Quarterly*, 21(2), 257–279. https://doi.org/10.1080/16184742.2020.1741013

Gassmann, O., & Enkel, E. (2004). Towards a theory of open innovation: three core process archetypes. *R&D Management Conference*, 6(0), 1–18.

Gerke, A., Haas, A., & Wäsche, H. (2025). Playing as a team or solo? Determinants for innovativeness of incubated sport business startups. Sport, Business and Management: An International Journal. Advance online publication. https://doi.org/10.1108/SBM-01-2025-0016

Granstrand, O., & Holgersson, M. (2020). Innovation ecosystems: A conceptual review and a new definition. *Technovation*, 90–91, 102098. https://doi.org/https://doi.org/10.1016/j.technovation.2019.102098

Gupta, A. K., Smith, K. G., & Shalley, C. E. (2006). The interplay between exploration and exploitation. *Academy of Management Journal*, 49(4), 693–706. https://doi.org/10.5465/AMJ.2006.22083026

Hammerschmidt, J., González-Serrano, M. H., Puumalainen, K., & Calabuig, F. (2024). Sport entrepreneurship: the role of innovation and creativity in sport management. *Review of Managerial Science*, 18(11), 3173-3202.

Harding, J., Lock, D., & Toohey, K. (2016). A social identity analysis of technological innovation in an action sport: judging elite half-pipe snowboarding. *European Sport Management Quarterly*, 16(2), 214–232. https://doi.org/10.1080/16184742.2016.1140796

Harith, S., McSweeney, M., Willem, A., Winand, M., & Marlier, M. (2025). The dark side of social innovation: integrating a digital application for sport-for-development programmes. *Sport Management Review*, 28(4), 676–704. https://doi.org/10.1080/14413523.2025.2497598

Harris, S. J., Metzger, M. L., & Duening, T. N. (2020). Innovation in national governing bodies of sport: investigating dynamic capabilities that drive growth. *European Sport*

Management Quarterly, 21(1), 94–115. https://doi.org/10.1080/16184742.2020.1725090

Hasche, N., Höglund, L., & Linton, G. (2016). Trust in open innovation: The case of a med-tech start-up. *European Journal of Innovation Management*, 19(1), 34–54. https://doi.org/10.1108/EJIM-07-2014-0077

Hoeber, L., Doherty, A., Hoeber, O., & Wolfe, R. (2015). The nature of innovation in community sport organizations. *European Sport Management Quarterly*, 15(5), 518–534. https://doi.org/10.1080/16184742.2015.1085070

Hoff, K., & Leopkey, B. (2025). Initiate, adopt, implement, and transfer: exploring the innovation process undergone by mega-sport event organizing committees. Sport Management Review, 28(3), 476–497. https://doi.org/10.1080/14413523.2025.2466923

Hoff, K., Ellis, D., & Leopkey, B. (2023). Innovation drivers, barriers, and strategies of organizing committees for the Olympic games: an embedded single-case study approach. *European Sport Management Quarterly*, 24(4), 811–833. https://doi.org/10.1080/16184742.2023.2195871

Jæger, K. (2019). Event start-ups as catalysts for place, sport and tourism development: Moment scapes and geographical considerations. *Sport in Society*, 23(1), 40–55. https://doi.org/10.1080/17430437.2018.1555218

Jones, I., Brown, L., & Holloway, I. (2013). Sampling. In *Sampling* (pp. 35-44). SAGE Publications Ltd, https://doi.org/10.4135/9781473914995.n5

Knaus, D. L., & Merkle, T. (2020). Open Innovation in Sports Management - The Case of the FIFA Museum in Zurich, Switzerland. In *Sport Entrepreneurship: An Economic, Social and Sustainability Perspective* (pp. 43–53). Emerald Group Publishing Ltd. https://doi.org/10.1108/978-1-83982-836-220201008

Lappalainen, L., Aleem, M., & Sandberg, B. (2023). How to manage open innovation projects? An integrative framework. *Project Leadership and Society*, 4, 100095. https://doi.org/10.1016/j.plas.2023.100095

Laursen, K., & Salter, A. (2006). Open for innovation: The role of openness in explaining innovation performance among UK manufacturing firms. *Strategic Management Journal*, 27(2), 131–150. https://doi.org/10.1002/smj.507

Levitt, B., & March, J. G. (1988). Organizational learning. *Annual review of sociology*, 14(1), 319-338.

Leydesdorff, L. (2012). The Triple Helix, Quadruple Helix, …, and an N-tuple of Helices: Explanatory models for analyzing the knowledge-based economy. *Journal of the Knowledge Economy*, 3(1), 25–35. https://doi.org/10.1007/s13132-011-0049-4

Li, Y., Vanhaverbeke, W., & Schoenmakers, W. (2008). Exploration and Exploitation in Innovation: Reframing the Interpretation. *Creativity and Innovation Management*, 17(2), 107-126. https://doi.org/10.1111/j.1467-8691.2008.00477.x

Lucassen, J. M. H., & Bakker, S. de. (2016). Variety in hybridity in sport organizations and their coping strategies. *European Journal for Sport and Society*, 13(1), 75–94. https://doi.org/10.1080/16138171.2016.1153880

March, J. G. (1991). Exploration and Exploitation in Organizational Learning. *Organization Science*, 2(1), 71–87.

Mastrostefano, C., Giachino, C., & Parola, F. (2020). The importance for a start-up to trust in open innovation: A systematic literature review. *Journal of Innovation & Knowledge*, 5(3), 193–204. https://doi.org/10.1016/j.jik.2020.01.003

McSweeney, M., Svensson, P., Hayhurst, L., & Safai, P. (Eds.). (2022). Social Innovation, Entrepreneurship, and Sport for Development and Peace (1st ed.). Routledge. https://doi.org/10.4324/9781003212744

Öberg, C., & Alexander, A. T. (2019). The openness of open innovation in ecosystems – Integrating innovation and management literature on knowledge linkages. *Journal of Innovation & Knowledge*, 4(4), 211-218. https://doi.org/10.1016/j.jik.2017.10.005

Pizzo, A. D., Baker, B. J., Jones, G. J., & Funk, D. C. (2021). Sport Experience Design: Wearable Fitness Technology in the Health and Fitness Industry. *Journal of Sport Management*, 35(2), 130-143. Retrieved Sep 23, 2025, from https://doi.org/10.1123/jsm.2020-0150

Randhawa, K., Vanhaverbeke, W., & Ritala, P. (2024). Legitimizing Digital Technologies in Open Innovation Ecosystems: Overcoming Adoption Barriers in Healthcare. *California Management Review*. https://doi.org/10.1177/00081256241276553

Smith, N. L., & Green, B. C. (2020). Examining the factors influencing organizational creativity in professional sport organizations. *Sport Management Review*, 23(5), 992–1004. https://doi.org/10.1016/j.smr.2020.02.003

Solinas, R., Pirina, M. G., & Farooq, M. (2025). Sports startups in Europe: A comparative bibliometric analysis of Germany and Italy. In EDULEARN25 Proceedings (pp. 10596–10604). IATED. https://doi.org/10.21125/edulearn.2025.2794

SportsTechX. (2024). *SportsTech Framework*. Accessed: August 29, 2025, from https://sportstechx.com/sportstech-framework/

Svensson, P. G., Andersson, F. O., Mahoney, T. Q., & Ha, J. P. (2019). Antecedents and outcomes of social innovation: A global study of sport for development and peace organizations. *Sport Management Review*, 23(4), 657–670. https://doi.org/10.1016/j.smr.2019.08.001

Svensson, P. G., & Hambrick, M. E. (2018). Exploring how external stakeholders shape social innovation in sport for development and peace. *Sport Management Review*, 22(4), 540–552. https://doi.org/10.1016/j.smr.2018.07.002

Thomas, L. D W, & Ritala, P. (2025). Open Innovation Ecosystems. In E. Päivi, M. Tero, L. Pikka-Maaria, & A. Hannula (Eds.), *Elgar Encyclopedia of Innovation Management* (pp. 117–122). Edward Elgar Publishing Ltd. https://doi.org/https://doi.org/10.4337/9781035306459

Tushman, M. L., & O'Reilly III. (1996). Ambidextrous Organizations: Managing Evolutionary and Revolutionary Change. *California Management Review*, 38(4), 8–30.

Uhrich, S. (2021). Sport spectator adoption of technological innovations: a behavioral reasoning analysis of fan experience apps. *Sport Management Review*, 25(2), 275–299. https://doi.org/10.1080/14413523.2021.1935577

Usman, M., & Vanhaverbeke, W. (2017). How start-ups successfully organize and manage open innovation with large companies. *European Journal of Innovation Management*, 20(1), 171–186. https://doi.org/10.1108/EJIM-07-2016-0066

von Schomberg, L., De Vita, K., Ghinoi, S., De Vita, R., & O'Rourke, G. (2025). Innovation in sport organisations: the role of formal organisational structures and informal networks. *Sport Management Review*, 1–28. https://doi.org/10.1080/14413523.2025.2534245

Wemmer, F., & Koenigstorfer, J. (2016). Open Innovation in Nonprofit Sports Clubs. *Voluntas*, 27(4), 1923–1949. https://doi.org/10.1007/s11266-015-9571-5

West, J., & Bogers, M. (2013). Leveraging External Sources of Innovation: A Review of Research on Open Innovation. *Journal of Product Innovation Management*, 31(4), 814–831. https://doi.org/10.1111/jpim.12125

Winand, M., Schneiders, C., Merten, S., & Marlier, M. (2021). Sports fans and innovation: An analysis of football fans' satisfaction with video assistant refereeing through social identity and argumentative theories. *Journal of Business Research*, 136, 99-109. https://doi.org/10.1016/j.jbusres.2021.07.029

Yun, J. H. J., Park, K. B., Gaudio, G. Del, & Corte, V. Della. (2020). Open innovation ecosystems of restaurants: geographical economics of successful restaurants from three cities. *European Planning Studies*, 28(12), 2348–2367. https://doi.org/10.1080/09654313.2020.1721438

7. Mapping Open Innovation strategies among sports start-ups in Europe

Canini D., Tjønndal A., and Vicentini F. (under review). Mapping Open Innovation strategies among sports start-ups in Europe. *Journal of Innovation & Knowledge*.

Introduction

During the last two decades, start-ups have increasingly been recognized as key actors in Open Innovation (OI) processes. Defined as temporary companies with the aim of developing scalable business models (Blank, 2010), start-ups are characterized by a lean organizational structure and limited resources. These characteristics mean that they need to quickly build external relationships to access knowledge, technology, capital and legitimacy (Spender et al., 2017; Kraus et al., 2019; Audretsch et al., 2023). Hence, relationships with external actors are instrumental for the survival of a start-up and strategically important for developing competitive advantages (Usman & Vanhaverbeke, 2017). However, as young companies, start-ups face two structural challenges: the *liability of newness* and the *liability of smallness* (Gimenez-Fernandez et al., 2020). The former refers to a lack of legitimacy and established networks, conditions that limit the ability to attract resources and partners. The latter concerns the scarcity of human and financial capital, which reduces the possibility of pursuing significant investments in research and development. The adoption of OI represents a response to these conditions of vulnerability. Through collaborations with external partners using OI strategies, start-ups can access knowledge, networks and financial resources that would otherwise be unattainable for them (Spender et al., 2017; Usman & Vanhaverbeke, 2017). Such collaborations may also accelerate learning processes, reduce the time it takes to develop a product and increase the likelihood of survival in highly competitive markets (Kraus et al., 2019; Marullo, 2018).

OI strategies are particularly relevant in sectors where rapid innovation and intense competition require emerging companies to continuously experiment with their business models. Among the contexts that best illustrate such conditions is sport. The sports industry is characterized by high public visibility, internationally recognized cultural legitimacy, strong user/fan community engagement, involvement of a variety of institutional actors (federations, local governments or international sports organizations), and growing connections with corporations, investors, and technology providers (Sivrikaya et al., 2018; Di Francesco & Ferraro, 2018; Mondalizadeh et al., 2024; Hammerschmidt et al., 2023). These traits make sport an interesting empirical context for the study of how start-ups manage the variety and intensity of OI strategies towards other actors in their Open Innovation Ecosystem (OIE) (Thomas & Ritala, 2025; Author reference A).

From this starting point, this study aims to examine how sports start-ups adopt OI strategies in relation to external actors within the OIE. Specifically, we examine the following research question: What configurations of Open Innovation strategies can be identified among sports start-ups in relation to external actors? To answer this question, a survey was administrated to a sample of 209 European sports start-ups, which collected data on the adoption of the four OI strategies (inside-out, outside-in, coupled, and outside-out) in relation to eight different external actors (Government and Policy makers, Universities and Research Institutions, Large Companies, Small Medium-sized Enterprises and Start-ups, Investors and Financial Partners, Intermediaries and Knowledge Brokers, Technology and Service Providers and Users and Customers).

This study addresses a gap in the literature on OI, which has paid little attention to the role of start-ups and their interactions with other external actors. In particular, the paper advances understanding of how start-ups structure their OI strategies in terms of the breadth and depth of collaboration with external actors (Laursen & Salter, 2006) and along the

exploration-exploitation continuum (March, 1991). By doing so, our study offers new perspectives on the different openness configurations applied by sport start-ups in relation to other OIE actors.

The paper is structured as follows. The next section presents a review of the literature on start-ups, open innovation, and ecosystem actors. Second, we outline our theoretical framework. Third, we describe the development of the survey and the subsequent cluster analysis. The article continues with a presentation of the results and discussion section. Finally, the conclusion summarizes the theoretical contribution, managerial and practical implications and directions for future research.

Literature Review: Start-ups, Open Innovation, and Ecosystem Actors

Recent literature (Bereczki, 2019; Usman & Vanhaverbeke, 2017; Lappalainen et al., 2023) has focused increasingly on the role of start-ups in OI processes. From an OI perspective, start-ups are interesting because they are often considered intrinsically open organizations, as the scarcity of internal resources forces them to seek external knowledge, capital and skills (Spender et al., 2017). However, this structural orientation of openness does not guarantee positive outcomes from collaborations with external actors. As Audretsch et al. (2023) points out, the results of start-ups' collaborative efforts depend on the ability to select the right partners and to balance the breadth and the depth of collaborations.

To better understand how innovative companies structure their openness, Ahn et al. (2015) proposed a classification of OI strategies in small and medium-sized enterprises (SMEs), distinguishing between inbound (outside-in), outbound (inside-out) and coupled approaches. The study shows that companies able to combine multiple forms of openness achieve higher innovative performance compared to those that rely on isolated strategies. A similar perspective is offered by Zhang et al. (2021), who analyzed how the participation of

start-ups in different innovation ecosystems interacts with the breadth and the depth of OI strategies. Their results highlight that innovative results are achieved when these strategies align with the characteristics of each ecosystem. This evidence reinforces the idea that OI should be interpreted as a configuration of strategies embedded in broader networks of interconnected actors.

Although the body of research on OI and start-ups has grown rapidly (Spender et al., 2017; Marullo, 2018; Audretsch et al., 2023), knowledge about how these young companies focus their openness strategies on specific actors in the ecosystem remains limited. Research has focused on specific types of collaborators, such as universities (Baron, 2021; Kiseleva et al., 2022; Miller et al., 2016; Rayna & Striukova, 2014), investors (Alam & Ansari, 2020; Fallah, 2022) or large companies (Bacon et al., 2020; Marozzo et al., 2023; Rohrbeck et al., 2009). However, this reductive approach risks to blur the fact that start-ups operate in complex, multi-actor environments, in which interactions with institutions, technology providers, customers, and intermediaries play complementary, and sometimes, contradictory roles (Zhang et al., 2021). Furthermore, quantitative empirical studies that aim to classify and map configurations of openness remain scarce, despite the growing attention to the taxonomies of strategies adopted by companies in specific sectoral contexts (Greco et al., 2015; Santoro et al., 2016).

To overcome some of these limitations, recent studies have introduced the concept of innovation ecosystems. An innovation ecosystem is defined as a multi-actor environment in which heterogeneous actors interact to create collective value (Adner, 2016; Grandstrand & Holgresson, 2020). Starting from this body of literature, an Open Innovation Ecosystem (OIE) can be described as orchestrated configurations of heterogeneous, interdependent and hierarchically independent actors that gravitate around a central company and co-create value by facilitating innovation through collaborative processes and translational knowledge flows

(Thomas & Ritala, 2025). Adopting the OIE lens allows us to better understand how the variety of multi-actor relationships influences the openness strategies of start-ups as highly innovative actors.

Theoretical Background

In order to map openness configurations of sports start-ups, we utilize a combination of theoretical concepts from OI literature, including OI strategies, the dimensions of breadth and depth, ambidexterity and the exploration-exploitation continuum.

Configuration of OI strategies

According to Chesbrough et al. (2014), OI refers to a model of distributed innovation that involves managing flows and outflows of knowledge across organizational boundaries, for pecuniary and non-pecuniary reasons, in line with the organization's business model. Although originally associated with large high-tech firms, the concept has been extended to cover SMEs and start-ups (Dahlander & Gann, 2010; Bogers et al., 2019; Dahlander et al., 2021; Radziwon and Bogers, 2019; Santoro et al., 2016), reflecting the variety of contexts in which boundary-spanning knowledge practices now occur.

This broadened applicability is reflected in the range of strategic approaches that organizations use to manage OI. Theoretical literature distinguishes at least five strategies for managing OI processes: (1) inside-out, (2) outside-in, and (3) coupled (Gassmann & Enkel, 2004), (4) outside-out and (5) inside-in (Gutmann et al., 2023). The inside-out strategy involves leveraging internal resources and skills through collaborations with external partners with the aim of expanding the impact of internally developed innovations (Mazzola et al., 2012). The outside-in strategy is based on acquiring external knowledge to enrich business processes and strengthen companies' innovation capabilities (Mazzola et al., 2012). The coupled strategy

integrates the two previous approaches, combining the acquisition of knowledge with the sharing of one's own innovation (Mazzola et al., 2012). The outside-out strategy focuses on the transfer of knowledge between external entities, without direct involvement of internal R&D (Gutmann et al., 2023; Randhawa et al., 2024), while the inside-in strategy reflects a closed model based on the internal circulation of knowledge (Gutmann et al., 2023). As the inside-in strategy reflects a closed innovation model we consider it less relevant for our study of sports start-ups' OI strategies.

A crucial contribution to theoretical literature on the interpretation of OI strategies was made by Laursen & Salter (2006), who conceptualized the dimensions of *breadth (*the range of partners involved in OI processes) and *depth* (the intensity of relationships with each partner). These dimensions allow us to go beyond analyzing single strategies, enabling observations of how start-ups combine horizontal (breadth) and vertical (depth) openness in different ways. Thus, breadth and depth are essential analytical tools to understand the overall configurations of OI strategies. Other studies have demonstrated how the dimensions of breadth and depth influence the innovative capacity of companies in other sectors (Greco et al., 2015; Moretti & Biancardi, 2019; Lu & Chesbrough, 2022). The same studies also illustrate the non-linear relationship between breadth and depth in companies' OI strategies. However, some studies have also mapped the risks of excessive openness, which can generate coordination costs and inefficient resource use (Dahlander et al., 2021; Felin & Zenger, 2020). In this study, we use the concepts of breadth and depth to analyze how and to what extent sports start-ups use OI strategies with the actors in the ecosystem in a comparative manner.

Ambidexterity and OI strategies

Another important theoretical concept for understanding OI strategies in start-ups is ambidexterity. As a theoretical concept, ambidexterity can be described as the organizational ability to balance exploration (search for new opportunities and knowledge) and exploitation

(efficient use of existing resources) (March, 1991; He & Wong, 2004). The strategic trade-off between these two logics is particularly relevant for start-ups, which must innovate and consolidate their business models at the same time. Empirical studies have shown that ambidexterity is associated with improved innovative performance, especially in contexts characterized by high uncertainty (Cao et al., 2009; Junni et al., 2013). While start-ups often prioritize exploration early on to differentiate in the market and attract investors, they quickly need to consolidate exploitation activities to secure economic sustainability (Rippa et al., 2019; Korpysa, 2021). OI strategies represent a useful framework for analyzing how start-ups manage this trade-off to ensure their survival in competitive markets. In the sports sector, start-ups must balance the need to propose innovations that capture the attention of users and investors with the need to ensure credibility and compliance with the stringent institutional regulations of international and national governing bodies (Author reference A). From this point of view, ambidexterity becomes a condition for survival in contexts characterized by multiple pressures and expectations.

Methodology

Sample

The sample identification process involved an initial mapping of 2.658 European sports start-ups. These were identified through sector databases such as SportsTechX, Dealroom and Crunchbase, acceleration programs and professional networks. Of these, 412 start-ups were excluded due to a lack of verifiable contacts, 362 did not respond to the invitation to participate in the survey and 998 were no longer active (closed, acquired or merged). The actual number of companies contacted was therefore 886, from which 209 (23.6%) valid responses were collected.

The inclusion criteria required that the start-ups: (1) have their operational headquarters in an European Union country; (2) be active in at least one of the sub-sector of sport industry according to the classification proposed by SportsTechX based on their target audience (For Athletes – Activity & Performance; For Executives – Management & Organizations; and For Fans – Fans & Content) (SportsTechX, 2024); and (3) the respondent hold an executive position with direct responsibility for the innovation processes of the start-ups.

Survey design and Measurements

The survey is based on a 4x8 conceptual matrix, which measures the use of four OI strategies: (1) inside-out, (2) outside-in, (3) coupled, and (4) outside-out, in relation to eight actors in the sports innovation ecosystem: (1) Government and Policymakers, (2) Universities and Research Institutions, (3) Large Companies, (4) SMEs and Start-ups, (5) Investors and Financial Partners, (6) Intermediaries and Knowledge Brokers, (7) Technology and Service Providers and (8) Users and Customers. The structure of the survey was inspired by established models in international literature on OI configurations (Laursen & Salter, 2006; Ahn et al., 2015; Zhu et al., 2019; Zhang et al., 2021) and the conceptualization of the OIE proposed by (Author reference A) for the sports context. The distribution of the survey and management of the survey data were done in compliance with the national and institutional ethical guidelines for (Country and institutional name removed for peer review).

For each of the 32 actor-strategy combinations, the respondents expressed their degree of use on a seven-point Likert scale (1=not at all; 7=to a great extent). The responses were treated as interval variables, in line with literature on management and innovation (Moretti & Biancardi, 2019; Lu & Chesbrough, 2022). Using the matrix, two indicators of strategic openness were constructed: breadth and depth. Breadth represents the extent of collaborations activated for each strategy and measures the horizontal diffusion of OI practices with different actors. Depth reflects the intensity of the relationship with each actor through multiple

strategies, indicating greater vertical integration in the innovation processes (Laursen & Salter, 2006).

Statistical Analysis

The statistical analysis was divided into two main phases: Principal Component Analysis (PCA) and Cluster Analysis. Both analyses were conducted using IBM SPSS Statistics (version 29.0.2.0).

Principal Component Analysis (PCA)

In the first phase, a PCA was conducted with the aim of reducing the 32 variables of the actor-strategy matrix to a smaller set of components. The quality of the dataset was preliminarily verified. The Kaiser-Meyer-Olkin (KMO) index returned a value of 0.810, while Bartlett's Test of Sphericity was significant (χ^2 (496) = 3709,792, p < 0,001), confirming the possibility of extracting relevant latent factors (Table 1). The extraction was performed using the principal component method, applying Kaiser's rule (eigenvalues > 1) and visual analysis of the Scree Plot (Figure 1). Nine components were thus identified, which together explain 72.033% of the total variance (Table 2).

Table 1. KMO and Bartlett's Test of Sphericity.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.810
Bartlett's Test of Sphericity	Approx. Chi-Square	3709.792
	df	496
	Sig.	<.001

Figure 1. Scree Plot.

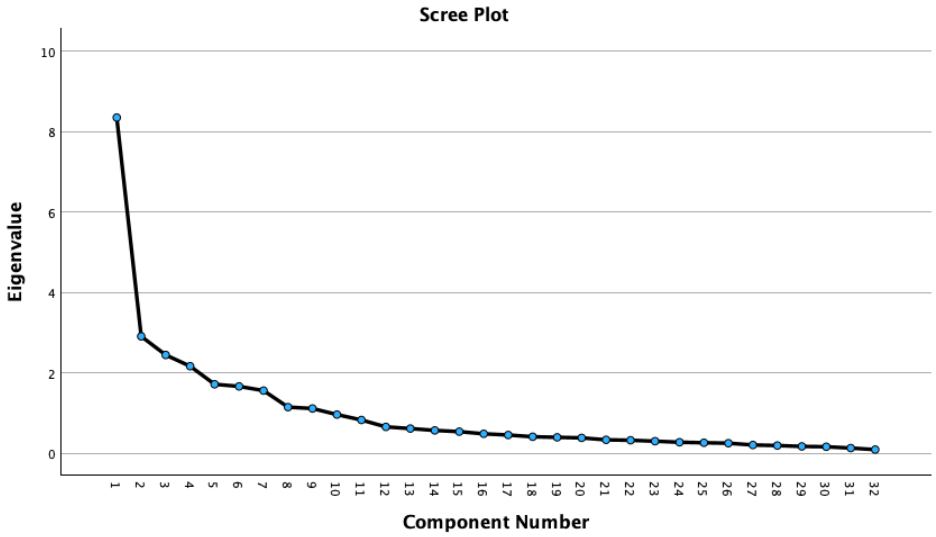


Table 2. Total Variance Explained.

Component	Total	% of Variance	Cumulative %
1	8.348	26.087	26.087
2	2.906	9.082	35.169
3	2.443	7.635	42.804
4	2.163	6.761	49.565
5	1.714	5.356	54.921
6	1.662	5.193	60.114
7	1.557	4.865	64.979
8	1.146	3.581	68.560
9	1.111	3.473	72.033

To facilitate interpretation, an oblique rotation (Oblimin with Kaiser normalization) was applied. Factor loadings were interpreted based on the Pattern Matrix, adopting minimum threshold of 0.30. The analysis showed that, with exception of one residual factor, the components corresponded consistently to the eight ecosystem actors originally included in the actor-strategy matrix. This result provided additional evidence of the internal validity of the survey design. Standardized factor scores were then saved using the regression method and used as inputs for the subsequent cluster analysis.

Cluster Analysis

In the second phase, a cluster analysis was run on the nine factor scores obtained from the PCA. A hierarchical cluster analysis (Ward's method with Euclidean squared distance) was

conducted to determine the appropriate number of clusters. The Agglomeration Schedule and dendrogram suggested the solutions with three or four clusters were the most plausible.

Based on these results, a non-hierarchical K-means cluster analysis was conducted by specifying k=4. The analysis produced four clusters, whose profiles are presented in the results (Table 4). To test robustness, the procedure was replicated with two random seed and case orders, obtaining comparable centroids and consistent profiles, which confirms the stability of cluster solution.

Results and Discussion

Descriptive analysis: a heatmap of actor-strategy relationships

Table 3 provides a heatmap with an initial representation of the openness practices adopted by sports start-ups towards the eight actors in the ecosystem. The *depth* column summarizes the average intensity of openness towards each actor, and the *breadth* row indicates the average extent of use of the different strategies.

Table 3. Heatmap of actor–strategy relationships in sports start-ups. Values range from 1 to 7 and are displayed using a gradient colour scale: red indicates lower values, green indicates higher values, and yellow represents intermediate values.

	Inside-Out	**Outside-In**	**Coupled**	**Outside-Out**	**DEPTH**
Government and Policymakers	1,6	2,9	1,9	2,2	**2,2**
Universities and Research Institutions	1,5	1,5	2,2	2,3	**1,9**
Large Companies	2,0	1,6	2,4	2,1	**2,0**
SMEs and Start-ups	2,0	2,1	2,4	2,2	**2,2**
Investors and Financial Partners	2,6	3,0	2,5	3,2	**2,8**
Intermediaries and Knowledge Brokers	1,7	1,9	1,8	1,6	**1,8**
Technology and Service Providers	1,8	2,4	2,2	1,8	**2,1**
Users and Customers	3,3	4,8	4,5	4,1	**4,2**
BREADTH	**2,1**	**2,5**	**2,5**	**2,4**	

The descriptive analysis reveals significant differences between actors. Users and Customers represent the actor towards whom start-ups show the greatest intensity of openness (depth=4.2), with particularly high values for the outside-in (4.8) and coupled (4.5) strategies (Table 3). This underlines how sport innovations are often user-driven, a result which aligns with those of previous studies of co-creation and the contribution of end users to the development of new products and services (Sivrikaya et al., 2018; Author reference B). Universities and Research Institutions (1.9) and Intermediaries and Knowledge Brokers (1.8) demonstrate the lowest scores, indicating that sport start-ups report a limited degree of openness towards these actors (Table 3). In terms of OI strategies, the European sports start-ups in our sample seem to favor the outside-in (breadth=2.5) and coupled (2.5) approaches, highlighting a propensity to absorb external knowledge and develop forms of bilateral

collaboration. The inside-out approach is the least common (2.1), suggesting that the transfer of internal knowledge or technology to the outside is still marginal compared to the other forms of openness (Table 3). However, the descriptive analysis conceals substantial variation revealed by the cluster analysis (Table 4). Whereas institutional actor seems minor in the results shown in Table 3, the cluster analysis (Table 4) indicates they are a primary reference for certain types of start-ups.

Openness configurations and interpretation of clusters

The cluster analysis (Table 4) identified a set of four different openness configurations amongst the European sport start-ups in our sample. We describe the identified clusters as: (1) Market-User Oriented Openness, (2) Institutional-Corporate Openness, (3) Investor-Driven Openness and (4) Technology-Provider Openness. Each cluster describes a specific combination of OI strategies adopted towards ecosystem actors, highlighting how some start-ups tend to favor certain partners or strategies, while others adopt more balanced or selective approaches. The identified clusters demonstrate how, within the same ecosystem, various strategic orientations can coexist reflecting different resource needs and growth paths.

Table 4. Final Cluster Centres.

		Cluster (number)			
Factor	**Name**	**1 (n = 101)**	**2 (n = 22)**	**3 (n = 62)**	**4 (n = 24)**
ZFAC1_1	*SMEs and Start-ups*	-.45751	.72911	.43613	.13033
ZFAC2_1	*Universities and Research Institutions*	.20402	-1.67469	.42257	-.41511
ZFAC3_1	*Intermediaries and Knowledge Brokers*	.38710	-.95532	-.22115	-.18204
ZFAC4_1	*Users and Customers*	.56596	-.46914	-.50685	-.64235
ZFAC5_1	*Large Companies*	-.37975	.89276	.48165	-.47615
ZFAC6_1	*Investors and Financial Partners*	-.59425	.38292	.72962	.26493
ZFAC7_1	*Technology and Service Providers*	-.40198	.47315	.16940	.82035
ZFAC8_1	*Residual*	.28227	.22987	.08409	-1.61583
ZFAC9_1	*Government and Policymakers*	-.23688	1.59212	-.38432	.53023

Market-User Oriented Openness

The first cluster (Table 4), representing almost half of the sample (101 start-ups, 48.3%), shows significant positive values in relations with Users and Customers (0,57) and Intermediaries and Knowledge Brokers (0,39), while it ranks negative values in interactions with Investors and Financial Partners (-0,59), SMEs and Start-ups (-0,46) and Technology and Services Providers (-0,40). Cluster 1 represents a strategy focused on openness to users and communities, aligning with studies that identify users as key knowledge sources and co-creators in innovation processes (Von Hippel, 2005; Sivrikaya et al., 2018; Author reference B). This is to be expected within sports, as users often see themselves as more than customers: they are enthusiasts, fans or practitioners who actively participate in the co-creation of value (Hoeber et al., 2015). Thus, start-ups belonging to cluster 1 build their innovativeness on market needs and feedback, focusing on collaborative processes that stimulate creativity and differentiation.

Theoretically, cluster 1 is characterized by an exploratory orientation, supporting the notion that a variety of external sources foster idea generation (Laursen & Salter, 2006). However, the limited depth (intensity of the score relative to a single actor) with other actors suggests that start-ups in this cluster risk remaining too dependent on short-term stimuli from the market, without establishing more structured collaborations with institutional of financial partners.

Institutional-Corporate Openness

The second cluster, which is the lowest of the sample (22 start-ups, 10.5%), is characterized by strong relationships with Government and Policymakers (1,59) and Large Companies (0,89), also accompanied by positive values with SMEs and Start-ups (0,73). In contrast, these start-ups report negative scores for Universities and Research Institutions (-1,67), Intermediaries and Knowledge Brokers (-0,95) and Users and Customers (-0,47) (Table 4).

Cluster 2 indicates an openness configuration in which priority is given to institutional and corporate relationships. This orientation reflects theoretical perspectives that see start-ups as entities constantly seeking stability and recognition within the ecosystem, despite acting as central nodes of innovation. Government and Policymakers and Large Companies, as highlighted by (Author reference A), often play an orchestrating role in the OIE, influencing innovative trajectories through initiatives such as call for proposals, support programs or merger and acquisition operations (Usman & Vanhaverbeke, 2017; Mondalizadeh, 2024).

The emphasis on depth with a select few dominant actors indicates an exploitative approach, which aims to consolidate available resources more than explore new ones. For sports start-ups in cluster 2, this approach offers advantages in terms of access to public tenders and institutional and corporate collaborations (Greco et al., 2015). At the same time, start-ups in cluster 2 risk becoming dependent on these big actors. In this context, the ability to balance the strategic trade-off between exploration and exploitation becomes a condition to mitigate these risks and ensure survival. Furthermore, the limited development of relationships with universities and users shows how, in cluster 2, a search for legitimacy prevails over experimentation and co-creation. As a result, start-ups in cluster 2 are more risk-averse and prioritize legitimization efforts.

Investor-Driven Openness

The third cluster, which includes 62 start-ups (29.6%), is characterized by high values with Investor and Financial Partners (0,73) and Large Companies (0,48), while Users and Customers (-0,51) and Government and Policymakers (-0,38) are negative (Table 4). This distribution suggests that start-ups in this cluster structure their OI strategies around seeking and maintaining external capital, identifying interactions with financial partners as the primary lever for growth. Investors provide them with financial resources, managerial skills, access to

networks and market visibility. Several studies have recognized these aspects as crucial for the growth and scalability of new businesses (Usman & Vanhaverbeke, 2017; Marullo, 2018; Duruflé et al. 2017).

From a theoretical point of view, cluster 3 reflects a form of ambidexterity in relation to a combination of exploration and exploitation. Exploration is stimulated by possibilities of investing in new opportunities, testing innovative ideas and accessing broader networks thanks to the support of investors. Exploitation occurs in the need to demonstrate concrete economic returns and consolidate results to fulfil expectations of financial partners (He & Wong, 2004; Junni et al., 2013).

Technology-Provider Openness

The fourth cluster (24 start-ups, 11.6%) shows positive values for Technology and Service Providers (0,82) and Government and Policymakers (0,53). Users and Customers (-0,64) show negative values, together with Large Companies (-0,48) and Universities and Research Institutions (-0,41) (Table 4). This configuration indicates a focus on technology transfer and integration of new solutions. Start-ups belonging to cluster 4 are characterized by their ability to collaborate with partners who provide specific expertise, digital technologies and analytical tools, reflecting an exploration-oriented approach (Rippa et al., 2019; Korpysa, 2021).

The positive scores of policymakers suggest that start-ups in cluster 4 also benefit from public programs that support technology transfers, allowing them to further strengthen their positioning within the OIE. However, the lack of interaction with users and universities points to a configuration of openness mainly introduced from outside, with limited co-creation processes. As such, start-ups in cluster 4 could have a limited ability to adapt to the needs of the sports market. Furthermore, excessive dependence on technology providers can lead to the

development of standardized or non-flexible solutions that are difficult to adapt to the rapid changes in demand. This can reduce the overall effectiveness of any innovation generated.

Discussion

Table 5 summarizes the four openness configurations identified with the cluster analysis, highlighting priority and marginal actors, the strategic orientation and the theoretical logic that characterizes them. The table shows how sports start-ups are distributed on a continuum between highly exploratory models to exploitative ones, with intermediate configurations.

Table 5. Openness configurations of sports start-ups

Cluster	N (%)	Priority Actors	Marginal Actors	Strategic Orientation	Theoretical Logic
(1) Market-User Oriented Openness	101 (48.3%)	Users and Customers (0,57), Intermediaries and Knowledge Brokers (0,39)	Investors and Financial Partners (-0,59), SMEs and Start-ups (-0,46), Technology and Service Providers (-0,40)	Strong openness to market and community, with a focus on co-creation and the ability to respond to user needs	Exploration dominant, driven by co-creation and user innovation processes; variety of external sources as a lever for generating new ideas
(2) Institutional-Corporate Openness	22 (10.5%)	Government and Policymakers (1,59), Large Companies (0,89), SMEs and Start-ups (0,73)	Universities and Research Institutions (-1,67), Intermediaries and Knowledge Brokers (-0,95), Users and Customers (-0,47)	Collaborations focused on institutional and corporate actors, with the aim of legitimacy and stability	Prevailing exploitation, consolidation of already available resources and reduced propensity to experiment
(3) Investor-Driven Openness	62 (29.6%)	Investor and Financial Partners (0,73), Large Companies (0,48)	Users and Customers (-0,51), Government and Policymakers (-0,38)	Openness built around external capital, with a strong focus on financial actors	Marked ambidexterity, exploration favored by investor resources, but exploitation imposed by the need to generate concrete results quickly
(4) Technology-Provider Openness	24 (11.6%)	Technology and Service Providers (0,82), Government and Policymakers (0,53)	Users and Customers (-0,64), Large Companies (-0,48), Universities and Research Institutions (-0,41)	Focus on technology transfer and the adoption of digital solutions, with the support of public programs	Prevailing exploration, with strong technological experimentation; secondary exploitation linked to institutional legitimization and initial market applications

Three different insights can be made by analyzing the clusters, as presented in Table 4 and 5. First, the variety of configurations amongst the four clusters indicates that there is no standardized model of openness that is valid for all start-ups. This confirms the relevance of configurational approaches in the study of Open Innovation (Greco et al., 2015; Zhang et al., 2021), meaning that collaborative openness towards external actors is a set of possible arrangements, each with advantages and risks, rather than a choice between openness and closure.

Secondly, the four identified clusters reflect different ways of managing the strategic trade-off between exploration and exploitation. While user-driven start-ups (cluster 1) prioritize exploration, co-creating with their users and with the support of intermediaries, institutional-corporate start-ups (cluster 2) focus on exploitation, seeking stability and consolidation in the market through collaborations with public bodies and big companies. Investor-driven oriented start-ups (cluster 3) are in an intermediate position as they are encouraged to experiment thanks to the resources they have obtained, but they must quickly produce tangible results to legitimize themselves with those who supported them. Finally, technology-provider oriented start-ups (cluster 4) are characterized by an unbalanced orientation towards exploration, but also present elements of exploitation linked to institutional legitimacy. Here too, our study highlights how start-ups constantly need to negotiate between openness to innovation and consolidation of already acquired resources, collaborating with different actors according to their needs.

Thirdly, the dominance of cluster 1 in our sample could be related to the empirical context and idiosyncrasies of the sports sector. Specifically, users are central partners for start-ups in cluster 1, which represents almost half of the sample. This result supports the unique nature of sport as an area in which user innovation plays a decisive role (von Hippel, 2005;

Sivrikaya et al., 2018; Author reference B). At the same time, it is also important to note the polarization regarding users. While for the start-ups in cluster 1 they represent essential partners in the innovation processes, in the other clusters their role appears marginal with negative values. This suggests that sports start-ups can have an important phase where users are the main source of knowledge and experimentation, followed by contrasting configurations in which users are largely disregarded. Although Cluster 2 is the smallest group, it can be interpreted as an example of how institutions and large firms tend to dominate the sport sector, with regulations and corporate ties shaping legitimacy and resource flows (Mondalizadeh, 2024; Author reference A). Similarly, cluster 3 highlights the role of investors as providers of capital, expertise and strategic support. This is especially relevant for sports start-ups, where credibility and scalability are crucial conditions for the growth of new business. Lastly, cluster 4 illustrates the growing importance of technology and service providers, showing how the digitalization of sport is transforming user engagement, performance monitoring and market opportunities (Di Francesco & Ferraro, 2018).

Overall, our results show that the openness configurations identified (Table 5) do not represent rigid patterns, but trajectories representing a variety of strategies adopted by sports start-ups. Surprisingly, some actors (universities and intermediaries) are systematically marginal. Here, the results indicate a discrepancy between the role universities and intermediaries are theoretically attributed in open innovation literature, which describes them as key hubs in the process of technology transfer and connection between actors (Laursen & Salter, 2004; Baron, 2021; Rayna & Striukova, 2014), and their effectiveness in the sports sector. This divergence suggests that sport may be characterized by its own dynamics related to expectations from users and the regulatory function of institutions. However, this does not mean that universities and intermediaries are not important actors for sport start-ups to

collaborate with, but that currently, they are not perceived by sport start-ups in Europe as significant collaboration partners.

Conclusion

This study examined the OI strategies of sports start-ups and how these strategies vary in relation to different ecosystem actors. Descriptive statistics revealed that the European sports start-ups in our sample have different degrees of openness towards the eight ecosystem actors included in the survey. A main finding from the descriptives is that sports start-ups show generally low openness to external collaboration in their OIE, with no item surpassing 5 on the 1–7 Likert scale and most scores near 1.5–2. That being said, the sports start-ups display the deepest intensity of openness to Users and Customers. In terms of OI strategies, the sports start-ups favour the outside-in and coupled strategies. Openness to Universities and Research Institutions and Intermediaries and Knowledge Brokers is low, with the inside-out strategy being the least common, showing limited outward transfer of internal knowledge amongst the sports start-ups.

The cluster analysis identified a set of four openness configurations amongst the sports start-ups. *Market-User Oriented Openness* (cluster 1) represents almost half of the sample (48.3%). Cluster 1 display intense openness (depth) towards Users and Customers, as well as Intermediaries and Knowledge Brokers, while are less engaged with other ecosystem actors (breadth). Thus, start-ups belonging to this cluster build their innovativeness on market needs and user feedback. Theoretically, cluster 1 represents an exploratory orientation. Cluster 2 (10.5%) prioritizes openness with Government and Policymakers and Large Companies, reflecting an *Institutional and Corporate-Oriented Openness*. Theoretically, cluster 2 represents an exploitative openness configuration which secures access to public tenders and corporate resources. Cluster 3 (29.6%) focus openness towards Investors and Financial Partners

and Large Companies (*Investor-Driven Openness*), indicating a growth model driven primarily by external capital and corporate ties. Theoretically, this configuration can be linked to ambidexterity, enabling exploration through investment-backed experimentation and exploitation through pressure to deliver measurable financial returns. Cluster 4 (*Technology-Provider Openness*, 11.6%) direct their openness towards to Technology and Service Providers and Government and Policymakers, indicating an exploration-oriented focus. Start-ups in cluster 4 leverages public support and provider expertise but risks limiting user co-creation which could result in reduced market adaptability, and overdependence on external technology solutions.

Overall, the identified clusters show how multiple strategic orientations coexist within the same OIE, reflecting different resource needs and growth paths amongst sports start-ups. These results offer theoretical, managerial and practical implications. Theoretically, the results extend the literature on Open Innovation and Open Innovation Ecosystem by demonstrating that start-up openness strategies are distributed along a continuum ranging from clearly exploratory configurations to more exploitation-oriented approaches, including hybrid forms characterized by ambidexterity (Rippa et al., 2019). This evidence underscores the centrality of the dimensions of *breadth* and *depth* (Laursen & Salter, 2006) and contributes to ongoing debates on the balance between exploration and exploitation in start-ups' open innovation strategies (March, 1991; He & Wong, 2004). Additionally, the limited openness to universities and intermediaries challenges the literature that places them as key hubs of innovation (Kraus et al., 2019; Marullo, 2018; Audretsch et al., 2023). The results reaffirm users' centrality in innovation processes for sports start-ups entering the market, while indicating that start-ups at different stages shift toward partnerships with financial or institutional actors to secure resources and legitimacy.

From a managerial and practical perspective, different openness configurations (clusters) require specific capabilities and tools. Hence, sports start-up executives should build adaptability and targeted competencies. Market-user oriented start-ups (cluster 1) need to develop the ability to manage heterogeneous feedback and co-creation processes with communities. Those oriented to institutions and large companies (cluster 2) need to consolidate their institutional legitimacy, while avoiding the risks of becoming excessively dependent on external actors. Start-ups that prioritize relationships with investors (cluster 3) must address the tensions between experimentation and financial pressures. Finally, managers of start-ups linked to technology and service providers (cluster 4) must tackle the challenges of translating technological solutions into accessible and relevant applications for the sports market. Taken together, these results illustrate how there is no single strategy for openness. Rather, managers need to develop adaptive skills and specific competencies, depending on the openness configurations in which start-up focus. At a broader level, there is a need for policy and ecosystem support tools that consider the specificities of the different configurations identified. These tools can strengthen the sustainability of sports ecosystems and help start-ups overcome the *liability of newness and smallness*. For instance, acceleration programs aimed at user engagement can support start-ups belonging to cluster 1 providing co-creations spaces and digital tools to systematically collect and transform feedback from the sports community into innovation processes. Or, for start-ups belonging from cluster 3, initiatives that go beyond simply providing financial resources are essential to help young companies manage the tension between exploration and short-term pressure.

This study also contributes to develop a new direction for research on OI strategies as it utilizes a research design which (although requiring further validation) represents a first step to understand the use of OI strategies between different actors in the OIE. The actor-strategy matrix used in this study can be applied to start-ups as well as all the other actors in the

ecosystem allowing to observe the dynamics of openness from different perspectives, providing a complete view of the OIE. The approach can also be extended beyond the sports sector and used in other industrial contexts, promoting cross-sectorial comparative studies. A relevant direction for future research would be to verify if the identified configurations remain stable or vary depending on the stage of development, the geographical context in which start-ups operate, or the amount of funding received. Future research must examine how these openness configurations affect start-ups' financial, non-financial, and innovation performance to map the concrete outcomes of different OI strategies and openness arrangements.

Acknowledgment

The authors acknowledge the use of ChatGPT (https://chatgpt.com – version GPT-5) and Microsoft Copilot GPT5 for text correction and checking of grammatical errors. The prompts applied were designed to: (1) correct grammatical errors, sentence structure, punctuation, and verb tense consistency; and (2) enhance vocabulary and readability by suggesting more precise, context-appropriate terms and replace repetitive words.

These suggestions were used to improve the language quality of the article, as neither author is a native English speaker. The authors take full responsibility for the content, as recommended by Committee on Publication Ethics (COPE), while recognizing the use of AI.

Disclosure statement

No potential conflict of interest was reported by the authors.

References

Adner, R. (2016). Ecosystem as Structure: An Actionable Construct for Strategy. *Journal of Management*, 43(1), 39–58. https://doi.org/10.1177/0149206316678451

Ahn, J. M., Minshall, T., & Mortara, L. (2015). Open innovation: A new classification and its impact on firm performance in innovative SMEs. *Journal of Innovation Management*, 3(2), 33–54.

Alam, M. A., & Ansari, K. M. (2020). Open innovation ecosystems: toward low-cost wind energy startups. *International Journal of Energy Sector Management*, 14(5), 853–869. https://doi.org/10.1108/IJESM-07-2019-0010

Audretsch, D. B., Belitski, M., Caiazza, R., & Lehmann, E. E. (2023). Effects of open innovation in startups: Theory and evidence. *Research Policy*, 52(1), 104674. https://doi.org/10.1016/j.respol.2022.104674

Bacon, E., Williams, M. D., & Davies, G. (2020). Coopetition in innovation ecosystems: A comparative analysis of knowledge transfer configurations. *Journal of Business Research*, 115, 307–316. https://doi.org/10.1016/j.jbusres.2019.11.005

Baron, M. (2021). Open Innovation Capacity of the Polish Universities. *Journal of the Knowledge Economy*, 12(1), 73–95. https://doi.org/10.1007/s13132-017-0515-8

Bereczki, I. (2019). An open innovation ecosystem from a startup's perspective. *International Journal of Innovation Management*, 23(8). https://doi.org/10.1142/S1363919619400012

Blank, S. (2010, January 25). What's a Startup? First Principles. https://steveblank.com/2010/01/25/whats-a-startup-first-principles/

Bogers, M., Chesbrough, H., Heaton, S., & Teece, D. J. (2019). Strategic Management of Open Innovation: A Dynamic Capabilities Perspective. *California Management Review*. https://doi.org/10.1177/0008125619885150

Cao, Q., Gedajlovic, E., & Zhang, H. (2009). Unpacking Organizational Ambidexterity: Dimensions, Contingencies, and Synergistic Effects. *Organization Science*, 20(4), 781–796. http://www.jstor.org/stable/25614692

Chesbrough, H., Vanhaverbeke, W., & West, J. (Eds.). (2014). New frontiers in open innovation. Oup Oxford.

Dahlander, L., & Gann, D. M. (2010). How open is innovation? *Research Policy*, 39(6), 699-709. https://doi.org/10.1016/j.respol.2010.01.013

Dahlander, L., Gann, D. M., & Wallin, M. W. (2021). How open is innovation? A retrospective and ideas forward. *Research Policy*, 50(4), 104218. https://doi.org/10.1016/j.respol.2021.104218

Di Francesco, A. & Ferraro, P. (2018). Digital sport startups: global trends and determinants of success.

Duruflé, G., Hellmann, T. F., & Wilson, K. E. (2017). From start-up to scale-up: Examining public policies for the financing of high-growth ventures. http://dx.doi.org/10.2139/ssrn.2913512

Fallah, M. R. (2022). Presenting a paradigmatic model for conceptualisation of innovation ecosystem in startups using meta-synthesis approach. *International Journal of Technology Management*, 88(1). https://doi.org/https://doi.org/10.1504/IJTM.2022.121442

Felin, T., & Zenger, T. R. (2020). Open innovation: A theory-based view. *Strategic Management Review*, 1(2), 223-232.

Gassmann, O., & Enkel, E. (2004). Towards a theory of open innovation: three core process archetypes. *R&D Management Conference*, 6(0), 1–18.

Gimenez-Fernandez, E. M., Sandulli, F. D., & Bogers, M. (2020). Unpacking liabilities of newness and smallness in innovative start-ups: Investigating the differences in

innovation performance between new and older small firms. *Research Policy*, 49(10), 104049. https://doi.org/10.1016/j.respol.2020.104049

Granstrand, O., & Holgersson, M. (2020). Innovation ecosystems: A conceptual review and a new definition. *Technovation*, 90-91, 102098. https://doi.org/10.1016/j.technovation.2019.102098

Greco, M., Grimaldi, M., & Cricelli, L. (2015). Open innovation actions and innovation performance: A literature review of European empirical evidence. *European Journal of Innovation Management*, 18(2), 150–171. https://doi.org/10.1108/EJIM-07-2013-0074

Gutmann, T., Chochoiek, C., & Chesbrough, H. (2023). Extending Open Innovation: Orchestrating Knowledge Flows from Corporate Venture Capital Investments. *California Management Review*, 65(2), 45–70. https://doi.org/10.1177/00081256221147342

Hammerschmidt, J., Durst, S., Kraus, S., & Puumalainen, K. (2023). Sport entrepreneurship: The role of innovation and creativity in sport management. *International Entrepreneurship and Management Journal*, 19(2), 591–611. https://doi.org/10.1007/s11365-022-00848-3

He, Z.-L., & Wong, P.-K. (2004). Exploration vs. Exploitation: An Empirical Test of the Ambidexterity Hypothesis. *Organization Science*, 15(4), 481–494. http://www.jstor.org/stable/30034750

Hoeber, L., Doherty, A., Hoeber, O., & Wolfe, R. (2015). The nature of innovation in community sport organizations. *European Sport Management Quarterly*, 15(5), 518–534. https://doi.org/10.1080/16184742.2015.1085070

Junni, P., Sarala, R. M., Taras, V., & Tarba, S. Y. (2013). Organizational Ambidexterity and Performance: A Meta-Analysis. *Academy of Management Perspectives*, 27(4), 299–312. https://doi.org/10.5465/AMP.2012.0015

Kiseleva, O. N., Sysoeva, O. V., Vasina, A. V., & Sysoev, V. V. (2022). Updating the Open Innovation Concept Based on Ecosystem Approach: Regional Aspects. *Journal of Open Innovation: Technology, Market, and Complexity*, 8(2). https://doi.org/10.3390/joitmc8020103

Korpysa, J. (2021). Process ambidexterity in startups innovation. *Management Systems in Production Engineering*, (1 (29), 27-32. https://doi.org/10.2478/mspe-2021-0004

Kraus, S., Roig-Tierno, N., & Bouncken, R. B. (2019). Open innovation in young SMEs. *International Journal of Technology Management*, 79(3–4), 235–252. https://doi.org/10.1504/IJTM.2019.10069548

Lappalainen, L., Aleem, M., & Sandberg, B. (2023). How to manage open innovation projects? An integrative framework. *Project Leadership and Society*, 4, 100095. https://doi.org/10.1016/j.plas.2023.100095

Laursen, K., & Salter, A. (2004). Searching high and low: What types of firms use universities as a source of innovation? *Research Policy*, 33(8), 1201-1215. https://doi.org/10.1016/j.respol.2004.07.004

Laursen, K., & Salter, A. (2006). Open for innovation: The role of openness in explaining innovation performance among UK manufacturing firms. *Strategic Management Journal*, 27(2), 131–150. https://doi.org/10.1002/smj.507

Lu, Q., & Chesbrough, H. (2022). Measuring open innovation practices through topic modelling: Revisiting their impact on firm financial performance. *Technovation*, 114, 102434. https://doi.org/10.1016/j.technovation.2021.102434

March, J. G. (1991). Exploration and Exploitation in Organizational Learning. *Organization Science*, 2(1), 71–87.

Marozzo, V., Abbate, T., Cesaroni, F., Crupi, A., & Di Minin, A. (2023). Orchestrating an Open Innovation Ecosystem in low-tech industries: the case of Barilla's Blu1877.

Technology Analysis and Strategic Management. https://doi.org/10.1080/09537325.2023.2222182

Marullo, C., Casprini, E., Minin, A. D., & Piccaluga, A. (2018). 'Ready for Take-off': How Open Innovation influences startup success. *Creativity and Innovation Management*, 27(4), 476-488. https://doi.org/10.1111/caim.12272

Mazzola, E., Bruccoleri, M., & Perrone, G. (2012). The effect of inbound, outbound and coupled innovation on performance. *International Journal of Innovation Management*, 16(6). https://doi.org/10.1142/S1363919612400087

Miller, K., Mcadam, R., Moffett, S., Alexander, A., & Puthusserry, P. (2016). Knowledge transfer in university quadruple helix ecosystems: An absorptive capacity perspective. *R and D Management*, 46(2), 383–399. https://doi.org/10.1111/radm.12182

Mondalizadeh, M., Khalilzadeh, A., & Heydari, A. (2024). Startup opportunities in the sports industry based on developing a conceptual framework for the sports ecosystem in Iran. *Journal of Entrepreneurship in Emerging Economies*. https://doi.org/10.1108/JEEE-12-2022-0376

Moretti, F., & Biancardi, D. (2019). Inbound open innovation and firm performance. *Journal of Innovation & Knowledge*, 5(1), 1-19. https://doi.org/10.1016/j.jik.2018.03.001

Radziwon, A., & Bogers, M. (2019). Open innovation in SMEs: Exploring inter-organizational relationships in an ecosystem. *Technological Forecasting and Social Change*, 146, 573-587. https://doi.org/10.1016/j.techfore.2018.04.021

Randhawa, K., Vanhaverbeke, W., & Ritala, P. (2024). Legitimizing Digital Technologies in Open Innovation Ecosystems: Overcoming Adoption Barriers in Healthcare. *California Management Review*. https://doi.org/10.1177/00081256241276553

Rayna, T., & Striukova, L. (2014). University-industry knowledge exchange: An exploratory study of Open Innovation in UK universities. *European Journal of Innovation Management*. http://ssrn.com/abstract=2412632

Rippa, P., Ponsiglione, C., Bocanet, A., Capaldo, G., & Zollo, G. (2019). Do new ventures explore, exploit or both? A case-based analysis of six innovative Italian start-ups. *International Journal of Entrepreneurial Behavior & Research*, 25(7), 1515-1536.

Rohrbeck, R., Hölzle, K., & Gemünden, G. H. (2009). Opening up for competitive advantage-How Deutsche Telekom creates an open innovation ecosystem. *R and D Management*, 39(4), 420–430. https://doi.org/https://doi.org/10.1111/j.1467-9310.2009.00568.x

Santoro, G., Bresciani, S., & Papa, A. (2016). How SMEs engage in open innovation: A survey. *Journal of the Knowledge Economy*, 10(1), 1–19. https://doi.org/10.1007/s13132-016-0434-4

Sivrikaya, G., Öztürk, S., & Küçükoğlu, H. (2018). Innovation in sports management and the role of users, open innovation and sport-based entrepreneurship. In B. Christiansen (Ed.), Global Innovation and Economic Value (pp. 258–278). IGI Global. https://doi.org/10.4018/978-1-5225-5646-6.ch015

Spender, J. C., Corvello, V., Grimaldi, M., & Rippa, P. (2017). Startups and open innovation: A review of the literature. *European Journal of Innovation Management*, 20(1), 4–30. https://doi.org/10.1108/EJIM-12-2015-0131

SportsTechX. (2024). SportsTech Framework. Accessed: August 29, 2025, from https://sportstechx.com/sportstech-framework/

Thomas, L. D W, & Ritala, P. (2025). Open Innovation Ecosystems. In E. Päivi, M. Tero, L. Pikka-Maaria, & A. Hannula (Eds.), Elgar Encyclopedia of Innovation Management

(pp. 117–122). Edward Elgar Publishing Ltd. https://doi.org/https://doi.org/10.4337/9781035306459

Usman, M. and Vanhaverbeke, W. (2017), "How start-ups successfully organize and manage open innovation with large companies", *European Journal of Innovation Management*, Vol. 20 No. 1, pp. 171-186. https://doi.org/10.1108/EJIM-07-2016-0066

Von Hippel, E. (2005). Democratizing innovation. MIT Press.

Zhang, J., Wang, Y., & Xu, C. (2021). Exploring the effects of innovation ecosystem models on innovative performances of start-ups: The contingent role of open innovation. *Technological Forecasting and Social Change*, 164, 120521. https://doi.org/10.1016/j.techfore.2020.120521

Zhu, X., Xiao, Z., Dong, M. C., & Gu, J. (2019). The fit between firms' open innovation and business model for new product development speed: A contingent perspective. *Technovation*, 86-87, 75-85. https://doi.org/10.1016/j.technovation.2019.05.005

8. Discussion

This chapter integrates the results from the three empirical studies to offer an overarching interpretation of how European sports start-ups collaborate with other actors and structure their OI strategies within OIEs. The discussion is divided in three sections: 1) users as key actors in Open Innovation in sport, 2) the tension between exploration, exploitation and legitimacy, and 3) irrelevance and inefficiency of intermediation structures.

8.1 Users as key actors in Open Innovation in sport

One of the main findings from Chapter 6 and Chapter 7 is the central role of users, fans and local communities in sport innovation processes. In line with the literature on user innovation (von Hippel, 2005; Bogers & West, 2012), the results show that in sport, knowledge generated by end users is a main driver of openness processes.

Insights from the analysis of Chapter 6 and Chapter 7 indicate that, for most start-ups, interaction with users is the most frequent and strategically relevant form of collaboration. In the quantitative data (Chapter 7), users and customers are the actors towards whom European start-ups declare the greatest intensity of openness (*depth*), with higher significant values for outside-in and coupled strategies (Chapter 7, Table 3, p. 151). This data is reflected in the narratives of the executives in the qualitative paper (Chapter 6), who describe users as a constant interlocutor in the definition of the product and business model. The empirical insights from Chapter 6 and Chapter 7 are consistent with the findings of Audretsch *et al*. (2023), underlining that innovation develops through continuous interaction between start-ups and user communities. Data analysis from Chapter 6 suggests that sports start-ups experience these feedback processes as learning

opportunities, in which interaction with users allows them to construct shared meanings, validate their solutions and adapt them to the social and organisational contexts in which they operate.

In theoretical terms, the importance of collaboration with users is an expression of the outside-in strategy of OI (Chesbrough, 2003; Laursen & Salter, 2006), in which organisations absorb knowledge and stimuli from outside to foster innovation. Historically, users have been considered external collaborators whose role is limited to providing suggestions to improve products and services (von Hippel, 2005; Bogers *et al*., 2010; Bogers & West, 2012). However, recent OI literature has begun to recognise users as co-developers, capable of contributing to defining of solutions and generating of knowledge (Randhawa *et al*., 2020; Audretsch *et al*., 2023). Still, in the sport sector, this role takes on another connotation. As discussed in Chapter 4, sport is based on broad participation (sport-for-all policies), sharing and collective involvement, elements that make users an integral part of co-creation processes. Innovation therefore takes shape through communities that contribute values, identities and experiences, directly guiding the development of products, services and sporting experiences.

In sport, the relationships between start-ups and user communities are based on trust and collective participation that make users such as athletes, fans and coaches actively involved in the innovation processes. For instance, sports fans establish emotional and symbolic ties with the clubs they follow, influencing strategies and decisions, while athletes who use digital platforms or wearable technologies help to test and improve products and services, providing data and ideas that are useful to develop new solutions. These unique characteristics of the sports sector blur the line between start-ups and users, transforming the relationship into a process of co-creation based on emotional involvement, knowledge sharing and collective value creation. Through these continuous interactions, start-ups gain legitimacy because support from users contributes to

increased visibility and recognition. As reported from executives in Chapter 6, most of their opportunities for development and visibility derive from the involvement of their community of users.

Co-creation dynamics between users and sport start-ups also reflects some structural characteristics of the sector. As illustrated in Chapter 6, sports start-ups often operate in niche contexts, where feedback cycles and proximity to users allows for immediate learning. This compensates, at least in part, for the scarcity of resources which is typical of young companies (Carrasco-Carvajal & García-Pérez-de-Lema, 2022), allowing start-ups to use their interaction with the market as a source of organisational learning (Levitt & March, 1988; Cohen & Levinthal, 1990). At the same time, this proximity entails risks related to a limited diversification of knowledge sources and dependence on specific audience segments, which can reduce the exploratory capacity of sports start-ups and generate vulnerability.

Overall, the user-driven approach that appears to be typical of sports start-ups can be interpreted as a form of bottom-up openness, in which knowledge is shared and co-produced through continuous and circular interactions between users and start-ups. Here, users act as co-developers of solutions, but also as validators and ambassadors of innovation, participating in dissemination processes that combine economic and social dimensions. For instance, findings from Chapter 6 show how user involvement has been decisive in both refining products and expanding the visibility of the start-ups included in the sample. Results from the quantitative study (Chapter 7) also underline this trend, highlighting that users and customers are the external actors considered most important in the OI collaboration of European sports start-ups.

8.2 Tension between exploration, exploitation and legitimacy

A second finding that appears across the empirical papers concerns the ability of sports start-ups to balance experimentation, consolidation and legitimacy. This tension, widely discussed in organisational theory through the concepts of exploration and exploitation (March, 1991), is evident in the sports start-ups included in this study. Specifically, sports start-ups' ability to innovate depends on how they manage to reconcile the need to explore new opportunities with the need to stabilise relationships, resources and credibility within the ecosystem.

The results of both the quantitative and qualitative work shows that start-ups pursue forms of openness that reflect this tension. In particular, in the quantitative results (Chapter 7), the strategic trade-off is demonstrated by the coexistence of four configurations of openness that show the variety of trajectories through which start-ups balance the search for opportunities and the consolidation of resources (Chapter 7, Table 5, p. 157). The qualitative data (Chapter 6) also highlight how experimentation is linked with a need for legitimacy, where start-ups must demonstrate credibility in order to attract investors and institutional partners. As one interviewee observed: "*When you're a start-up nobody knows you, and that's the hard part. So, you can collaborate, but only on a small scale*" (Chapter 6, p. 120).

The legitimacy work reflects typical challenges faced by young and small businesses, recognised in literature as the *liability of newness* and *smallness* (Usman & Vanhaverbeke, 2017; Gimenez-Fernandez *et al*., 2020). Limited resources reduced visibility and fragile relational capital make start-ups vulnerable to power asymmetries and dependency dynamics in their interactions with larger and more established organisations. These dynamics are further amplified in the sport sector by broader cultural barriers identified in Chapter 4, specifically the sector's resistance to change, the presence of rigid institutional logics and the culture of competitiveness that can easily

erode mutual trust and prevent. However, the qualitative data (Chapter 6) shows how sports start-ups depend on their collaborative relationships with more structured actors, such as sport federations, large companies or public institutions for recognition, funding and access to knowledge networks. Some of the interviewees described how, after successful experiences with large companies or institutional partners, they found themselves in situations of imbalance or even exclusion: "*We still did some really interesting things and did them well, achieving numbers that the* [name of company] *had never achieved before, and then the following year they disappeared and came back with a service that was designed to be our direct competitor. So, this gives you an idea of the situation*" (Chapter 6, p. 122). Experiences such as this show how sports start-ups work to gain legitimacy can turn into a condition of structural vulnerability, in which trust and collaboration become indispensable but at the same time risky tools. In asymmetric collaborations, dependence on more established actors limits the ability of start-ups to explore new solutions independently, forcing them into strategies of adaptation. This can hinder innovation, as the need to maintain stable relationships and ensure recognition may lead start-ups to favour conservative choices and already validated solutions. As discussed in Chapter 4, such an orientation toward innovation may be reinforced by the sector's traditionalism and limited tolerance for organisational change. In this way, experimentation may be reduced and more radical proposals mediated to avoid conflicts or reputational risks. Over time, this logic of adaptation could limit the ability to generate disruptive innovations, favouring incremental development paths that conform to the expectations of dominant actors in the sector.

A main finding in Chapter 6 is that the balancing act between exploration and exploitation represents a strategic decision characterised by a continuous learning process. As highlighted by March (1991) and Levinthal & March (1993), organisations evolve through cycles of

experimentation and refinement that allow them to adapt to environmental changes. In the case of sports start-ups, this process is significant because their characteristics prompt them to use every collaboration as an opportunity for learning and legitimisation. However, the qualitative findings show that this process is often slowed down by bureaucratic and institutional constraints, especially in relations which public entities (Chapter 6, p. 124).

The quantitative results also illustrate the tension between exploration and exploitation, as the configurations identified in Chapter 7 show how some start-ups prioritise market- and user-oriented strategies, while others focus on relationships with investor or institutions (Chapter 7, Table 5, p. 157). This suggests that companies modulate their degree of openness based on their stage of development, resources and the type of recognition they seek externally. This adaptive approach, understood as the ability of start-ups to change their opening strategies based on what they have available and how things stand, suggests that legitimacy within sports OIEs should be understood as a relational and constantly evolving process, rather than as an acquired status. For sports start-ups, credibility is built progressively through interaction, reciprocity and concrete contributions to collective innovation processes. This dynamic reflects the cooperative, yet bureaucratically constrained, tendencies of sports culture described in Chapter 4, where trust is both a starting point and a result of collaboration. From this perspective, the construction of legitimacy in sports start-ups can be interpreted as a process that takes shape within relationships they develop with other actors in the ecosystem. The findings show that this legitimacy is consolidated over time through interactions that require collaboration, trust and mutual recognition. In a sector such as sport, often characterised by resistance to change and rigid institutional logics, this process is important, because each relationship allows these cultural barriers to be gradually overcome. Start-ups thus learn to navigate institutional constraints, social

expectations and market opportunities, adapting their approach to openness according to the context. Collaboration becomes a learning opportunity that helps to redefine roles, meanings and practices of innovation. In this context, innovation takes the form of a dynamic process, marked by continuous negotiations between actors and adjustments of start-up strategies in response to changes in the ecosystem.

8.3 Irrelevant and inefficient? Sports' start-ups perception of intermediaries

A third finding from both Chapter 6 and Chapter 7 concerns how sports start-ups perceive that there is a lack of sports specific intermediaries. In research on OI from other sectors, universities, accelerators and knowledge brokers are recognised as important intermediaries for knowledge transfer and coordination between actors (Rohrbeck *et al*., 2009; Miller *et al*., 2016; Laursen & Salter, 2006). However, they appear to have limited interactions with start-ups in the sports sector. For instance, the qualitative results (Chapter 6) show that start-ups executives describe detached relationships with academia and entrepreneurial support programmes. Universities are perceived as overly theoretical or slow, unable to quick translate research into operational applications (Chapter 6, p. 127). The descriptive analysis in Chapter 7 indicates similar tendencies as Universities and Research Institutions and Intermediaries and Knowledge Brokers have the lowest average openness scores (depth) among all actors considered, indicating limited interactions between sports start-ups and these actors (Chapter 7, Table 3, p. 151). Furthermore, this trend remains constant across all identified strategic configurations (Chapter 7, Table 5, p. 157). The convergence between qualitative and quantitative evidence suggests that this limited relevance of intermediary actors is a structural feature of the European sports ecosystem.

This finding contradicts research on OIEs in other sectors, which identifies intermediaries and universities as key actors in supporting collaboration, knowledge dissemination and the

legitimisation of innovations (Baron, 2021; Rayna & Striukova, 2014; Randhawa *et al*., 2020). In sport, however, the lack of specialised intermediaries and technology transfer programmes targeted to the sector seems to create a "connection gap" between scientific knowledge and market needs. The sports start-ups struggle to find partners capable of translating academic research into operational solutions or strategic collaboration opportunities or accelerators and incubators dedicated specifically to sport (Chapter 6, p. 127).This does not imply that these actors are irrelevant, but it does indicate that the sports innovation infrastructure is still underdeveloped, lacking stable mechanisms to facilitate the meeting of research, business and institutions. The development of specialised intermediaries and technology transfer programmes dedicated to sport, capable of establishing collaborations between universities, companies and institutions is therefore a necessity. Thus, the presence of intermediaries can foster an open ecosystem, able to exploit the innovative potential generated in different sub-sectors of sport.

One possible explanation for the lack of specialised intermediaries lies in the cultural and institutional characteristics that define the European sport sector. As discussed in Chapter 4 and illustrated through the qualitative (Chapter 6) and quantitative (Chapter 7) findings, sports start-ups operate in a context where collaboration is based primarily on direct relationships and personal networks, rather than on formalised intermediation channels. This finding reflects the pragmatic and community-based tradition of sport, where trust, proximity and reciprocity are valued more highly than standardised procedures or institutional partnerships (Hoeber *et al*., 2015; Delshab *et al*., 2022; Gammelsæter, 2021; Hammerschmidt *et al*., 2024). However, the same informality limits the possibilities for building stable knowledge transfer infrastructures and may hinder the creation of a shared language between research, business and institutions, thus limiting the overall capacity of sports sector to develop innovation.

The implications of this situation are reflected at several levels. First, the inefficiency of intermediaries limits start-ups' access to specialised knowledge, financial resources and management skills. Secondly, it reduces the overall capacity of the ecosystem to integrate emerging innovations, as there is a lack of entities capable of mediating between the academic, institutional and market dimensions. Finally, the absence of dedicated infrastructure accentuates the fragmentation of the system, forcing start-ups to build informal networks based on trust and reciprocity, but lacking continuity over time.

Overall, the irrelevance and inefficiency of intermediation structures is one of the main challenges for the maturation of OIEs in sport. Investing in the creation of specialised innovation hubs, thematic accelerators and impact-oriented university-business partnerships appears to be a crucial step for strengthening collaborative dynamics and supporting more structured forms of openness and knowledge exchange within the ecosystem. Only by consolidating these intermediary channels will it be possible to transform the current fragmentation into an open system capable of connecting skills, knowledge and resources to promote innovation in the European sports sector.

9. Conclusion

In this chapter, I present the main findings of the research, the theoretical, managerial, and practical implications, future directions and final reflections.

9.1 Main findings

The thesis was guided by the research question: *How do European sport start-ups collaborate with actors in Open Innovation Ecosystems, and what strategies characterize these relationships?* I examined this question through a combination of theoretical and empirical approaches, allowing me to identify and analyse the dynamics of collaboration and the OI strategies European sports start-ups. I developed a four-ways approach, setting specific aims for each of them: (1) understanding how culture and institutional contexts shape innovation in sport; (2) examining the forms and structures through which OI takes shape in sport; (3) exploring the role and experiences of start-ups as actors in the OIE; and (4) understanding the configurations of openness and collaboration that characterize the relationships between sports start-ups and other actors. By integrating the findings of the four contributions (Chapter 4-7), I outlined a broad interpretation of the processes of openness in the European sports sector, showing how these processes are shaped by cultural values, institutional logics and collaborative practices through which start-ups build their relationships.

In response to the first aim, my research shows that innovation processes in European sport are deeply linked to the cultural values and institutional logic that characterise the sector. The work developed in Chapter 4 illustrates how the active involvement of sporting communities and the continuous circulation of experiences and knowledge influence the way in which actors collaborate and build trust. This cultural framework constitutes the context within which start-ups define their

OI strategies and select the partners with whom to develop collaborations. Institutional dynamics characterised by traditionalism, established logics and a widespread resistance to change in organised sport, further limit the space in which innovation can develop. In this way, innovation cultures in sport influences the strategies and collaborative relationships analysed in Chapter 6 and Chapter 7. The empirical results from these contributions illustrate how cultural resistance, bureaucracy rigidity and non-flexible organisational models affect the way start-ups operate within the sport ecosystem and their ability to establish effective collaborations.

The second aim concerned the forms through which OI is structured in sport. The scoping review in Chapter 5 allowed me to develop a conceptual framework on OIEs and adapt it to the specificities of the sport sector. A main finding in chapter 5 is that OI takes the form of a process supported by knowledge flows that cross organisational boundaries and involve heterogeneous actors. In the proposed model, I described the ecosystem as an open and flexible structure, in which roles and relationships are defined through continuous adjustments to the flows of knowledge between actors. The empirical results (Chapter 6 and Chapter 7) demonstrate how this innovation processes take shape within collaborative networks that function in different ways depending on the context. Some relationships are more structured, while others are based on mutual trust and the actors that should facilitate connections between entities are not always present or function irregularly. In Chapter 6, for instance, executives described collaborations with federations or large companies as often characterised by long timelines and rigid procedures. In contrast, relationships with users and communities tend to be more direct and continuous, favouring rapid feedback cycles and adaptation of solutions.

The third aim focuses on the role of start-ups as actors in the ecosystem. The interviews analysed in Chapter 6 show that collaboration is interpreted by executives as an opportunity to

learn, consolidate their credibility and access resources that would be otherwise difficult to obtain. Relationships with users represent privileged spaces for dialogue and experimentation, while those with institutions and large companies require negotiations skills and adaptation to the conditions set by more structured actors. The cultural perspective of Chapter 4 helps to understand why these processes are often complex and why start-ups face obstacles related to resistance to change and established institutional logics.

The fourth aims concerned openness configurations and collaboration strategies. The quantitative results in Chapter 7 show that outside-in and coupled are the strategies most used by European sports start-ups, particularly with users and customers. Relationships with universities and intermediaries are less developed, consistent with the inefficiency highlighted in the interviews (Chapter 6). The analysis of these strategic clusters outlines different ways in which sports start-ups combine experimentation, consolidation and the search for legitimacy, adapting their degree of openness according to the actors with whom they interact.

The qualitative and quantitative evidence in Chapter 6 and Chapter 7 show that collaboration is built through a network of different relationships. Users represent the most stable and accessible point of reference, while relationships with institutions and large companies require greater adaptability, negotiation skills and the ability to navigate power asymmetries. Here, sports start-ups develop their OI strategies by alternating moments of experimentation and consolidation, using interactions with external actors as opportunities to learn, gain recognition and strengthen their position in sports ecosystems. The cultural perspective analysed in Chapter 4 and the conceptual model in Chapter 5 work to explain why these processes take different forms. Sport innovation develops in a context that values participation but is also influenced by established institutional logics that determine the timing and methods of collaboration.

The contributions of Chapter 6 and Chapter 7 also demonstrate that the OI strategies adopted by sports start-ups differ according to the actors involved, the resources available and the conditions of the context. Collaborative choices do not follow a single pattern but are defined over time through continuous adjustments, in line with the conceptual model presented in Chapter 5. Overall, findings from chapter 6 and 7 highlights that European sports start-ups manage openness as a dynamic process, based on the ability to learn from interactions, build credibility and adapt to opportunities that come in their environment. The integration of cultural analysis, theoretical modelling, qualitative study and quantitative research thus offers an overview of collaboration processes in European sport, showing that relationships between ecosystem actors are crucial to innovate. These considerations introduce the discussion of the theoretical, managerial and practical implications.

9.2 Implications

The scientific work presented in this thesis has theoretical, managerial and practical implications. Theoretically, my thesis expands the understanding of Open Innovation by applying this theoretical perspective to sport, a sector in which collaboration processes take specific forms. The findings of Chapter 6 and 7, combined with the cultural framework of Chapter 4, show that outside-in and coupled strategies develop through the continuous circulation of experiences and knowledge from sporting communities towards sports start-ups. In sport, those strategies reflect a cultural logic that guides the openness practices of start-ups. In this sense, OI takes on a relational dimension, shaped by cultural and institutional dynamics that affect the way actors build trust and exchange knowledge. The significance of culture and institutional dynamics represents a novel contribution to Open Innovation theory. In this sense, the results extend the OI theoretical concepts developed in other industrial and technological sectors (Randhawa *et al*., 2020; Meenakshisundaram &

Shankar, 2009; Dianova *et al*., 2023), showing how, in sport, openness is less driven by efficiency or market logic and more rooted in cultural, relational and participatory dynamics. It's likely that these dynamics could be found in sectors which are similar to sport, such as in culture and music industries, something which would strengthen the generalisability of this theoretical contribution of the thesis.

Secondly, I contribute to theoretical literature on Open Innovation Ecosystems with the development of the conceptual model of Open Innovation Ecosystems in sport presented in Chapter 5. Here, the results in Chapter 6 and 7 also contribute to OIE theory by demonstrating that sports OIEs work as open networks with different levels of formalisation between actors, where users play an important role and intermediaries have less influence than in other sectors. This suggests that the applicability of the OIE model developed for sports depends on specific contextual conditions, such as higher user involvement and a low level of intermediation mechanisms.

The start-up perspective, a distinctive element of my thesis, allows me to observe OI from within young companies which are exposed to resource constraints and legitimisation dynamics that influence the adoption of openness strategies. The results show that the combined use of collaboration diversification (*breadth*) and relationship deepening (*depth*) becomes significant in terms of the ability to manage power asymmetries, interpret the expectations of more structured actors and learn through continuous adjustment cycles. In this way, the findings from the qualitative and quantitative work (Chapter 6 and 7) also contributes to the theoretical concepts of exploration-exploitation and organisational learning. For sports start-ups, the balance between experimentation and consolidation seems to be linked to contextual conditions rather than internal organisational choices. Learning is a distributed process, built through recurring interactions with

users, institutions and technology providers. As start-ups mature, the tension between exploration and exploitation may evolve, shifting from a phase where openness is primarily used to validate solutions and gain visibility, to a phase where collaborations become more selective and consolidation oriented. Further research is needed to examine this development trajectory empirically.

From a managerial perspective, my thesis offers useful insights for the different actors operating in sports OIEs. Organisations that play an orchestrator role (namely Government and Policymakers, University and Research Institutions) have one key take-away message from my research: the effectiveness of innovation processes depends on the ability to create conditions that make collaboration more accessible and safer, especially for young companies as the start-ups. As reported in Chapter 6 and 7, many relationships are slowed down by inflexible procedures, long decision-making times and engagement methods that are not always well defined. By clarifying collaboration mechanisms, reducing bureaucratic obstacles and introducing regulated experimentation spaces, organisations playing an orchestrator role can facilitate effective and constructive Open Innovation processes. Other actors involved in the ecosystem, including SMEs, clubs, technology providers or local authorities, can also find useful insights in my thesis. The results from Chapter 6 and 7 outline that users and communities are an essential reference point in sport innovation processes, and that their ongoing involvement guides the development of products and services. For these actors, expanding their boundaries of openness is a lever for improving the solutions they offer by involving users through testing and feedback, make it possible to innovate more quickly and direct resources towards initiative with greater operational relevance. However, this openness requires clear forms of coordination in which aims, responsibilities and methods of participation are defined. A further implication concerns actors operating in the field of

intermediation, such as accelerators, incubators or knowledge brokers. My thesis highlights their sporadic presence in the sport sector, with limited impact on the circulation of knowledge between research, businesses, institutions or investors. Here, promoting sport-specific innovation programmes and strengthening technology transfer mechanisms can be a useful strategy for consolidating the infrastructure supporting OI and improving the ecosystem's ability to exploit solutions implemented by start-ups.

From a practical point of view, the findings offer useful guidance to sport start-ups on how to manage open relationships and develop effective collaborative pathways. The analyses in Chapter 6 show that dialogue with users and communities is one of the main areas for learning and validating solutions. Integrating regular feedback collection, iterative testing and early users' engagement allows for the development of products that are more responsive to market needs and builds legitimacy. Start-up can also benefit from investing in differentiated collaboration strategies. The quantitative findings in Chapter 7 highlight that the level of openness depends on the ability to combine deeper relationships with key actors (such as users, technology providers or investors) with broader forms that allow for network expansion and access to new knowledge. This balance can help start-ups reduce the vulnerability resulting of their characteristics within the ecosystem. While the strategy-actor matrix in Chapter 7 was developed as a comparative analysis tool for studying openness configurations, its structure also allows for reflective use by start-ups or other actors in the ecosystem. By periodically filling in the matrix, companies can visualise their collaboration strategies with other actors, identifying areas of strength or weakness and promoting more informed management of openness processes.

9.3 Future directions for research

The findings provide a basis for developing new lines of research on the role of sports start-ups and sports OIE in Europe. The first area concerns the temporal dimension of collaboration. Chapter 6 shows that trust, legitimacy and learning are built progressively through recurring interactions, while Chapter 7 highlights that OI strategies take different forms depending on the actors involved. However, there is limited insight into how these processes evolve over the different stages of start-ups growth. Specifically, longitudinal studies could use the actor-strategy matrix as an annual (or semi-annual) assessment tool for the openness process of start-ups. Monitoring the values of the matrix and analysing their changes over a period of at least five years, following different stages of development, would provide useful practical and managerial implications, broaden the theoretical considerations around this topic and clarify what conditions support the ongoing of openness processes.

A second topic concerns the link between openness configurations and performance. Chapter 7 identifies distinct configurations in the adoption of OI strategies and in the management of relationships with external actors, while Chapter 6 highlights how these choices are influenced by organisational and institutional constraints. Future research could analyse how the prevalence of specific strategies or the key role of certain actors relates to different performance metrics. In terms of financial performance, it would be useful to consider metrics such as turnover, profitability or capital raised; for non-financial performance, the numbers of employees, active users or retention rates; and for innovative performance, the launch of new products or features, new patents or new partnerships. This would make it possible to understand which openness configurations are most effective.

A third area of investigation could be the comparative dimension. Chapter 4 shows that innovation processes are deeply influenced by the cultural and institutional contexts in which organisations operate. It would be useful to develop studies comparing different national sport ecosystems to understand how the specific characteristics of different European countries and regions influence opportunities for collaboration, barriers and the maturation of the OIEs. The use of a multi-level framework combining institutional variables (sport governance, policy, national/regional innovation ecosystems) and market characteristics (market size, density of commercial partners) would identify how opportunities and barriers to collaboration differ across national contexts in Europe and beyond.

Finally, the findings in Chapter 6 and 7 highlight the inefficiency of intermediation mechanisms in the European sport sector. Universities, accelerators and knowledge brokers play a less significant role than in other sectors, with consequences for the circulation of knowledge and the establishment of structured links between research, business and institutions. Future research could explore which intermediation models are most effective for the sports context, helping to strengthen the ecosystem's ability to support distributed innovation processes.

9.4 Limitations

As is the case with all scientific work, my thesis has some limitations which should be considered when interpreting the results presented here. First, the cross-sectional nature of quantitative data collected in through the survey (Chapter 7) does not allow for an analysis of how the OI strategies adopted by sports start-ups evolve over time. The identified openness configurations represent a snapshot of specific stages in the start-up's development.

Secondly, the qualitative study (Chater 6) is based on a sample of interviews selected through a self-selection process, which involved only start-ups that had expressed their willingness to

participate. This approach allowed for the involvement of start-ups involved directly involved in innovation processes, but also encouraged the participation of companies particularly interested in OI. This may have limited the representation of executives from start-ups that are less structured or aware of these strategies.

A further limitation concerns the potential risk of social desirability bias in the survey responses. As the data is self-reported by executives directly involved in decision-making processes, it is possible that some collaborative practices or OI strategies have been presented in a manner consistent with the dominant narratives on innovation, rather than with the practices involved. Anonymisation and the structure of the survey helped to mitigate the risk but did not eliminate it completely.

Finally, the empirical focus on the European context could represents a limitation in terms of the generalisability of the results. The collaboration dynamics, the role of the actors and the openness configurations analysed are influenced by specific cultural, institutional and regulatory characteristics of the European sports sector. Therefore, the extension of the conceptual model and results to non-European context should be addressed and supported by future comparative studies.

9.5 Final reflections

My thesis is a first systematic attempt to analyse innovation in sport through the lens of the Open Innovation, adopting the perspective of start-ups as key actor in collaboration and learning processes within the Open Innovation Ecosystem. The aim that guided the research was to understand how start-ups build and manage their relationships through OI strategies with other actors of the sports OIE. The integration of theoretical and empirical approaches has allowed me to identify how innovation in sport comes from a complex intertwining of relationships between different actors, guided by shared values of trust, legitimacy and mutual learning. My work

contributes to broadening the application of Open Innovation and Open Innovation Ecosystem to a field that is still unexplored, showing how value creation in sport depends on cultural dimensions, as well as the quality of relationships and the ability of actors to learn together.

Overall, my thesis shows how innovation in sport develops within a relational system in which knowledge, trust and legitimacy are key conditions. By analysing the OI strategies adopted by start-ups, my research demonstrates how openness contributes to the maturation of the ecosystem, offering a novel perspective for interpreting the collaborative dynamics that foster innovation in sport.

Reference

Adner, R. (2016). Ecosystem as Structure: An Actionable Construct for Strategy. *Journal of Management*, 43(1), 39–58. https://doi.org/10.1177/0149206316678451

Ahn, J. M., Minshall, T., & Mortara, L. (2015). Open innovation: A new classification and its impact on firm performance in innovative SMEs. *Journal of Innovation Management*, 3(2), 33–54.

Arksey, H., & O'Malley, L. (2005). Scoping studies: Towards a methodological framework. *International Journal of Social Research Methodology: Theory and Practice*, *8*(1), 19–32. https://doi.org/10.1080/1364557032000119616

Audretsch, D. B., Belitski, M., Caiazza, R., & Lehmann, E. E. (2023). Effects of open innovation in startups: Theory and evidence. *Research Policy*, 52(1), 104674. https://doi.org/10.1016/j.respol.2022.104674

Balboni, B., Bortoluzzi, G., Pugliese, R., & Tracogna, A. (2019). Business model evolution, contextual ambidexterity and the growth performance of high-tech start-ups. *Journal of Business Research*, 99, 115-124. https://doi.org/10.1016/j.jbusres.2019.02.029

Baregheh, A., Rowley, J., & Sambrook, S. (2009). Towards a Multidisciplinary Definition of Innovation. *Management Decision*, 47, 1323-1339. https://doi.org/10.1108/00251740910984578

Baron, M. (2021). Open Innovation Capacity of the Polish Universities. *Journal of the Knowledge Economy*, 12(1), 73–95. https://doi.org/10.1007/s13132-017-0515-8

Bez, S., & Le Roy, F. (2023). Open innovation and coopetition: Toward coopetitive open innovation. In H. Chesbrough, A. Radziwon, W. Vanhaverbeke, & J. West (Eds.), *The Oxford Handbook of Open Innovation* (Chapter 15, pp. 237–253). Oxford University Press.

Blank, S. (2010, January 25). What's a Startup? First Principles. https://steveblank.com/2010/01/25/whats-a-startup-first-principles/

Blomqvist, K., Hurmelinna-Laukkanen, P., & Mention, A. L. (2023). Toward integrating trust in open innovation. In H. Chesbrough, A. Radziwon, W. Vanhaverbeke, & J. West (Eds.), *The Oxford Handbook of Open Innovation* (Chapter 13, pp. 199–218). Oxford University Press.

Bogers, M., & West, J. (2012). Managing distributed innovation: Strategic utilization of open and user innovation. *Creativity and innovation management*, 21(1), 61-75.

Bogers, M., Zobel, A. K., Afuah, A., Almirall, E., Brunswicker, S., Dahlander, L., Frederiksen, L., Gawer, A., Gruber, M., Haefliger, S., Hagedoorn, J., Hilgers, D., Laursen, K., Magnusson, M. G., Majchrzak, A., McCarthy, I. P., Moeslein, K. M., Nambisan, S., Piller, F. T., … Ter Wal, A. L. J. (2017). The open innovation research landscape: established perspectives and emerging themes across different levels of analysis. *Industry and Innovation*, 24(1), 8–40. https://doi.org/10.1080/13662716.2016.1240068

Cao, Q., Gedajlovic, E., & Zhang, H. (2009). Unpacking Organizational Ambidexterity: Dimensions, Contingencies, and Synergistic Effects. *Organization Science*, 20(4), 781–796. http://www.jstor.org/stable/25614692

Carrasco-Carvajal, C., & García-Pérez-de-Lema, D. (2022). Measuring open innovation in SMEs: An overview of current research. *Sustainability*, 14(5), 2854. https://doi.org/10.3390/su14052854

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35(1), 128–152.

Chesbrough, H. W. (2003). *Open Innovation: The New Imperative for Creating and Profiting from Technology*. Harvard Business School Press. https://books.google.it/books?id=4hTRWStFhVgC

Chesbrough, H. (2006), "New puzzles and new findings", in Chesbrough, H., Vanhaverbeke, W. and West, J. (Eds.), *Open Innovation: Researching a New Paradigm*, Oxford University Press, Oxford, pp. 1-12.

Chesbrough, H. W. (2024). Two decades of open innovation. In H. W. Chesbrough, W. Vanhaverbeke, J. West, & A. Radziwon (Eds.), The Oxford Handbook of Open Innovation (pp. 3–22). Oxford University Press.

Chesbrough, H., Vanhaverbeke, W., & West, J. (Eds.). (2014). *New frontiers in open innovation*. Oup Oxford.

Clark, V. L. P., Creswell, J. W., Green, D. O., & Shope, R. J. (2008). Mixing quantitative and qualitative approaches: An introduction to emergent mixed methods research. In S. N. Hesse-Biber & P. Leavy (Eds.), *Handbook of emergent methods* (pp. 363–387). The Guilford Press.

Correia, O. L. P. (2021). Sport innovation ecosystems: Exploring interorganisational relationships and the impacts of ecosystem innovation on sport organisations [Doctoral dissertation, Loughborough University]. *Loughborough University Research Repository*.

Corthouts, J., Winand, M., & Scheerder, J. (2021). A three-dimensional model of innovation within Flemish non-profit sports organisations. *European Sport Management Quarterly*, 23(3), 853–876. https://doi.org/10.1080/16184742.2021.1936115

Dahlander, L., & Gann, D. M. (2010). How open is innovation? *Research Policy*, 39(6), 699–709.

Dahlander, L., Gann, D. M., & Wallin, M. W. (2021). A curated list on the risks of openness. *Research Policy*, 50(9), 104329.

Delshab, V., Winand, M., Sadeghi Boroujerdi, S., Hoeber, L., & Mahmoudian, A. (2022). The impact of knowledge management on performance in nonprofit sports clubs: the mediating role of attitude toward innovation, open innovation, and innovativeness. *European Sport Management Quarterly*, 22(2), 139–160. https://doi.org/10.1080/16184742.2020.1768572

Dianova, V., Miniero, G., & Suleiman, D. (2023). Towards an open innovation ecosystem in the cultural industry: The bright side of trust and the dark side of measurement. *Journal of Philanthropy and Marketing*, 28(4), e1784. https://doi.org/10.1002/nvsm.1784

Di Francesco, A. & Ferraro, P. (2018). *Digital sport startups: Global trends and determinants of success* (Master's thesis). Politecnico di Milano.

Eggebø, H. (2020). Collective qualitative analysis: Methodological reflections from a team-based research project. *Qualitative Research*, 20(4), 512–528. https://doi.org/10.1177/1468794119884804

Enkel, E., Gassmann, O., & Chesbrough, H. (2009). Open R&D and open innovation: exploring the phenomenon. *R&D Management*, 39(4), 311-316.

FC Barcelona. (n.d.). *Barça innovation hub*. FC Barcelona. https://barcainnovationhub.fcbarcelona.com/

Freeman C. (1974). *The Economics of Industrial Innovation*. Pinter, London.

Freeman, C., & Soete, L. (1997). *The Economics of Industrial Innovation*. Psychology Press.

Gammelsæter, H. (2021). Sport is not industry: bringing sport back to sport management. European Sport Management Quarterly, 21(2), 257–279. https://doi.org/10.1080/16184742.2020.1741013

Gassmann, O., & Enkel, E. (2004). Towards a theory of open innovation: three core process archetypes. *R&D Management Conference*, 6(0), 1–18.

Gerke, A., Haas, A., & Wäsche, H. (2025). Playing as a team or solo? Determinants for innovativeness of incubated sport business startups. *Sport, Business and Management: An International Journal*. https://doi.org/10.1108/SBM-01-2025-0016

Gimenez-Fernandez, E. M., Sandulli, F. D., & Bogers, M. (2020). Unpacking liabilities of newness and smallness in innovative start-ups: Investigating the differences in innovation performance between new and older small firms. *Research Policy*, 49(10), 104049. https://doi.org/10.1016/j.respol.2020.104049

Godin, B. (2006). The Linear Model of Innovation. *Science, Technology, & Human Values*. https://doi.org/10.1177/0162243906291865

Godin, B. (2015). *Innovation contested: The idea of innovation over the centuries* (1st ed.). Routledge. https://doi.org/10.4324/9781315855608.

Granstrand, O., & Holgersson, M. (2020). Innovation ecosystems: A conceptual review and a new definition. *Technovation*, 90-91, 102098.

Greco, M., Grimaldi, M., & Cricelli, L. (2015). Open innovation actions and innovation performance: A literature review of European empirical evidence. *European Journal of Innovation Management*, 18(2), 150–171.

Gutmann, T., Chochoiek, C., & Chesbrough, H. (2023). Extending Open Innovation: Orchestrating Knowledge Flows from Corporate Venture Capital Investments. *California Management Review*, 65(2), 45–70. https://doi.org/10.1177/00081256221147342

Hammerschmidt, J., González-Serrano, M. H., Puumalainen, K., & Calabuig, F. (2024). Sport entrepreneurship: the role of innovation and creativity in sport management. *Review of Managerial Science*, 18(11), 3173-3202.

Hasche, N., Höglund, L., & Linton, G. (2016). Trust in open innovation: The case of a med-tech start-up. *European Journal of Innovation Management*, 19(1), 34–54. https://doi.org/10.1108/EJIM-07-2014-0077

He, Z. L., & Wong, P. K. (2004). Exploration vs. Exploitation: An Empirical Test of the Ambidexterity Hypothesis. *Organization Science*, 15(4), 481–494. http://www.jstor.org/stable/30034750

Hesse-Biber, S. N., & Leavy, P. (Eds.). (2010). *Handbook of emergent methods*. Guilford Press.

Hoeber, L., Doherty, A., Hoeber, O., & Wolfe, R. (2015). The nature of innovation in community sport organizations. *European Sport Management Quarterly*, 15(5), 518–534. https://doi.org/10.1080/16184742.2015.1085070

Hoff, K., & Leopkey, B. (2025). Initiate, adopt, implement, and transfer: exploring the innovation process undergone by mega-sport event organizing committees. *Sport Management Review*, 28(3), 476–497. https://doi.org/10.1080/14413523.2025.2466923

Junni, P., Sarala, R. M., Taras, V., & Tarba, S. Y. (2013). Organizational Ambidexterity and Performance: A Meta-Analysis. *Academy of Management Perspectives*, 27(4), 299–312. https://doi.org/10.5465/AMP.2012.0015

Khursheed, A., & Mustafa, F. (2021). Role of innovation ambidexterity in technology startup performance: an empirical study. *Technology Analysis & Strategic Management*, 36(1), 29–44. https://doi.org/10.1080/09537325.2021.2020235

Kline, S.J. and Rosenberg, N. (1986) An Overview of Innovation. In: Landau, R. and Rosenberg, N., Eds., *The Positive Sum Strategy: Harnessing Technology for Economic Growth*, National Academy Press, Washington DC, 275-307.

Knaus, D. L., & Merkle, T. (2020). Open Innovation in Sports Management - The Case of the FIFA Museum in Zurich, Switzerland. In *Sport Entrepreneurship: An Economic, Social and Sustainability Perspective* (pp. 43–53). Emerald Group Publishing Ltd. https://doi.org/10.1108/978-1-83982-836-220201008

Laursen, K., & Salter, A. (2006). Open for innovation: The role of openness in explaining innovation performance among UK manufacturing firms. *Strategic Management Journal*, 27(2), 131–150. https://doi.org/10.1002/smj.507

Levitt, B., & March, J. G. (1988). Organizational learning. *Annual review of sociology*, 14(1), 319-338.

Love, J. H., Roper, S., & Vahter, P. (2014). Learning from openness: The dynamics of breadth and depth in open innovation. *Research Policy*, 43(5), 923–932.

Lucassen, J. M. H., & Bakker, S. de. (2016). Variety in hybridity in sport organizations and their coping strategies. European Journal for Sport and Society, 13(1), 75–94. https://doi.org/10.1080/16138171.2016.1153880

March, J. G. (1991). Exploration and Exploitation in Organizational Learning. *Organization Science*, 2(1), 71–87.

Marullo, C., Casprini, E., Minin, A. D., & Piccaluga, A. (2018). 'Ready for Take-off': How Open Innovation influences startup success. *Creativity and Innovation Management*, 27(4), 476-488. https://doi.org/10.1111/caim.12272

McCraw, T. K. (2007). *Prophet of Innovation: Joseph Schumpeter and Creative Destruction*. Harvard University Press. https://doi.org/10.2307/j.ctt13x0gh3

Meenakshisundaram, R., & Shankar, B. (2011). Business model innovation by Better Place: A green ecosystem for the mass adoption of electric cars. In M. Pirson (Ed.), *Case studies in social entrepreneurship and sustainability* (pp. 25–28). Routledge.

Miller, K., Mcadam, R., Moffett, S., Alexander, A., & Puthusserry, P. (2016). Knowledge transfer in university quadruple helix ecosystems: An absorptive capacity perspective. *R&D Management*, 46(2), 383–399. https://doi.org/10.1111/radm.12182

Mondalizadeh, M., Khalilzadeh, A., & Heydari, A. (2024). Startup opportunities in the sports industry based on developing a conceptual framework for the sports ecosystem in Iran.

Journal of Entrepreneurship in Emerging Economies. https://doi.org/10.1108/JEEE-12-2022-0376

Müller, S. D., Påske, N., & Rodil, L. (2019). Managing Ambidexterity in Startups Pursuing Digital Innovation. Communications of the Association for Information Systems, 44, pp-pp. https://doi.org/10.17705/1CAIS.04418

Plano Clark, V. L., Creswell, J. W., Green, D. O., & Shope, R. J. (2008). Mixing quantitative and qualitative approaches: An introduction to emergent mixed methods research. In S. N. Hesse-Biber & P. Leavy (Eds.), Handbook of emergent methods (pp. 363–387). The Guilford Press.

Randhawa, K., West, J., Skellern, K., & Josserand, E. (2020). Evolving a Value Chain to an Open Innovation Ecosystem: Cognitive Engagement of Stakeholders in Customizing Medical Implants. *California Management Review*, 63(2), 101–134. https://doi.org/10.1177/0008125620974435

Randhawa, K., Bogers, M., & Mount, M. (2024a). Extending the scope of open innovation. In H. W. Chesbrough, W. Vanhaverbeke, J. West, & A. Radziwon (Eds.), *The Oxford Handbook of Open Innovation* (pp. 45–67). Oxford University Press.

Randhawa, K., Vanhaverbeke, W., & Ritala, P. (2024b). Legitimizing Digital Technologies in Open Innovation Ecosystems: Overcoming Adoption Barriers in Healthcare. *California Management Review*. https://doi.org/10.1177/00081256241276553

Rayna, T., & Striukova, L. (2014). University-industry knowledge exchange: An exploratory study of Open Innovation in UK universities. *European Journal of Innovation Management*. http://ssrn.com/abstract=2412632

Rohrbeck, R., Hölzle, K., & Gemünden, G. H. (2009). Opening up for competitive advantage-How Deutsche Telekom creates an open innovation ecosystem. *R&D Management*, 39(4), 420–430. https://doi.org/https://doi.org/10.1111/j.1467-9310.2009.00568.x

Rogers, E. M. (1962). *Diffusion of innovations*. Free Press of Glencoe

Schumpeter, J. A. (1939). *Business cycles: A theoretical, historical, and statistical analysis of the capitalist process*. McGraw-Hill.

Shilbury, D., O'Boyle, I., & Ferkins, L. (2016). Towards a research agenda in collaborative sport governance. *Sport Management Review*, 19(5), 479–491. https://doi.org/https://doi.org/10.1016/j.smr.2016.04.004

Sieg, J. H., Wallin, M. W., & Krogh, G. V. (2010). Managerial challenges in open innovation: A study of innovation intermediation in the chemical industry. *R&D Management*, 40(3), 281-291. https://doi.org/10.1111/j.1467-9310.2010.00596.x

Spender, J. C., Corvello, V., Grimaldi, M., & Rippa, P. (2017). Startups and open innovation: A review of the literature. *European Journal of Innovation Management*, 20(1), 4–30. https://doi.org/10.1108/EJIM-12-2015-0131

SportsTechX. (2024). SportsTech Framework. Accessed: August 29, 2025, from https://sportstechx.com/sportstech-framework/

Thomas, L. D. W., & Ritala, P. (2022). Ecosystem legitimacy emergence: A collective action view. *Journal of Management*, 48(3), 515–541. https://doi.org/10.1177/0149206320986617

Thomas, L. D W, & Ritala, P. (2025). Open Innovation Ecosystems. In E. Päivi, M. Tero, L. Pikka-Maaria, & A. Hannula (Eds.), *Elgar Encyclopedia of Innovation Management* (pp.

117–122). Edward Elgar Publishing Ltd. https://doi.org/https://doi.org/10.4337/9781035306459

Tjønndal, A. (2017). Sport innovation: developing a typology. *European Journal for Sport and Society*, 14(4), 291–310. https://doi.org/10.1080/16138171.2017.1421504

Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., Moher, D., Peters, M. D. J., Horsley, T., Weeks, L., Hempel, S., Akl, E. A., Chang, C., McGowan, J., Stewart, L., Hartling, L., Aldcroft, A., Wilson, M. G., Garritty, C., … Straus, S. E. (2018). PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. In *Annals of Internal Medicine* (Vol. 169, Issue 7, pp. 467–473). American College of Physicians. https://doi.org/10.7326/M18-0850

Tushman, M. L., & O'Reilly III. (1996). Ambidextrous Organizations: Managing Evolutionary and Revolutionary Change. *California Management Review*, 38(4), 8–30.

Usman, M. & Vanhaverbeke, W. (2017), How start-ups successfully organize and manage open innovation with large companies, *European Journal of Innovation Management*, Vol. 20 No. 1, pp. 171-186. https://doi.org/10.1108/EJIM-07-2016-0066

Vanhaverbeke, W., & Gilsing, V. (2024). Opening up open innovation: Drawing the boundaries and extending the framework. In H. W. Chesbrough, W. Vanhaverbeke, J. West, & A. Radziwon (Eds.), *The Oxford Handbook of Open Innovation* (pp. 23–44). Oxford University Press.

von Hippel, E. (1988), *The Sources of Innovation*, Oxford University Press, New York.

von Hippel, E. (2005). *Democratizing innovation*. MIT Press.

Wemmer, F., Emrich, E., & Koenigstorfer, J. (2016). The impact of coopetition-based open innovation on performance in nonprofit sports clubs. *European Sport Management Quarterly*, 16(3), 341–363. https://doi.org/10.1080/16184742.2016.1164735

Zhang, J., Wang, Y., & Xu, C. (2021). Exploring the effects of innovation ecosystem models on innovative performances of start-ups: The contingent role of open innovation. *Technological Forecasting and Social Change*, 164, 120521. https://doi.org/10.1016/j.techfore.2020.120521

Zhu, X., Xiao, Z., Dong, M. C., & Gu, J. (2019). The fit between firms' open innovation and business model for new product development speed: A contingent perspective. *Technovation*, 86-87, 75-85. https://doi.org/10.1016/j.technovation.2019.05.005

Zwift. (n.d.). *Welcome to zwift*. https://www.zwift.com/