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## Investigating Entrepreneurial and Innovation Ecosystems for Conceptual Understanding and Practical Applications

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### Abstract

This research paper addresses the lack of clarity and challenges in applying the ecosystem concept by systematically analyzing and comparing two complex conceptualizations of entrepreneurial and innovation ecosystems. Through a literature synthesis, essential distinguishing characteristics are identified using an inductive approach, facilitating the understanding of ecosystem configurations. Clustering procedures are employed to identify distinct ecosystem groups, summarized in a table. The study aims to provide a comprehensive understanding of entrepreneurial and innovation ecosystems to empower the research community and practitioners in developing effective ecosystem management approaches.

Keywords: Ecosystem; Entrepreneurial ecosystem; Innovation ecosystem

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### 1.0 Introduction

Since its introduction two decades ago, the concept of an ecosystem has garnered increased attention among researchers in the management field. This rapid growth justifies the recent emergence of discussions by Daymond et al. (2023), Autio et al. (2021), Cobben et al. (2022), and other scholars. This study aims to explore the characteristics of both entrepreneurial and innovation ecosystems and distinguish the similarities and differences between both concepts. It is crucial to examine the potential overuse of the ecosystem term due to its broad conceptual scope, as it runs the risk of becoming a temporary trend in the literature (Guggenberger et al., 2020).

In the entrepreneurship literature, the term "ecosystem" has been utilized in various contexts, including entrepreneurship policy portfolios (Fischer et al., 2022; Santos, D., 2022), regional clusters of entrepreneurs and specialized resources (Gamma-Vigouroux et al., 2022), and even national systems of entrepreneurship (Gamidullaeva et al., 2021). Both innovation and entrepreneurial ecosystems share the notion that organizations operate within network structures comprising co-specialized entities that play complementary roles in collaborative value creation, deviating from the traditional competitive markets with impersonal transactions and direct competition among firms offering substitute products (Belitski, M., Godley, A., 2020).

Despite the increasing interest in entrepreneurial and innovation ecosystems, limited research has investigated the interactions between these two types of ecosystems. Existing studies have predominantly focused on entrepreneurship within the context of innovation ecosystems. For instance, Morrison, Edward F. (2018) examines the rise of regional economy literature and identifies different research streams catering to business managers, regional policymakers, and university leaders. These streams converge on the key concepts of ecosystems and platforms, generating valuable insights through different perspectives and fostering tighter integration. However, these studies do not directly address the interactions between entrepreneurial ecosystems, where new ventures

are launched, and the innovation ecosystems in which they operate. This omission is noteworthy, given recent research suggesting that entrepreneurs can derive benefits from being embedded in multiple ecosystems (Gamma-Vigouroux et al., 2022).

Multiple scholars have drawn attention to the abundance of conceptualizations surrounding entrepreneurial and innovation ecosystems in the literature. For instance, Autio and Thomas (2021) highlight the use of ecosystem concepts in innovation contexts to bring clarity to the conceptual ambiguity surrounding the notion of ecosystems in innovation. Similarly, De Bernardi et al. (2020) recognize the broad dimensions of entrepreneurial and innovation activities and advocate for holistic and inclusive network approaches that facilitate co-creation activities for sustainability. However, these concepts lack clear boundaries and often overlap, leading to the overutilization of the term. Consequently, researchers face challenges in identifying, distilling, and investigating specific ecosystem concepts relevant to their respective fields (Santos, D., 2022).

This paper research review adheres to established principles within a wide range of distinct literature review forms, each with its own orientation and aim. Our focus is on the traits that individual authors assign to ecosystem concepts. This method is similar to a mapping study (Paré et al., 2015), in which we identify the characteristic of individual concepts and determine generic categories of primary ecosystems. We begin by selecting databases that cover the most important database journals and then filter for peer-reviewed papers. We chose the WoS and Scopus databases since they match the basic requirements. We conduct an initial search for "ecosystems" within database journals to find the most relevant ecosystem as well as scope for additional inquiry (see Figure 1). Based on the results of the preliminary research, we undertake a second search iteration focusing on the Entrepreneurship Ecosystem and the Innovation Ecosystem. Although more concept exist, such as business, platform, service, and IoT ecosystems, we consider those two types to be the key concepts within ecosystem research. The summarised search process is depicted and quantified in Figure 1. We manually selected the remaining publications after making an initial reduction inside the databases themselves, for example, by removing biological and psychological contributions. We only examined papers that dealt with our research aims based on the manual selection.

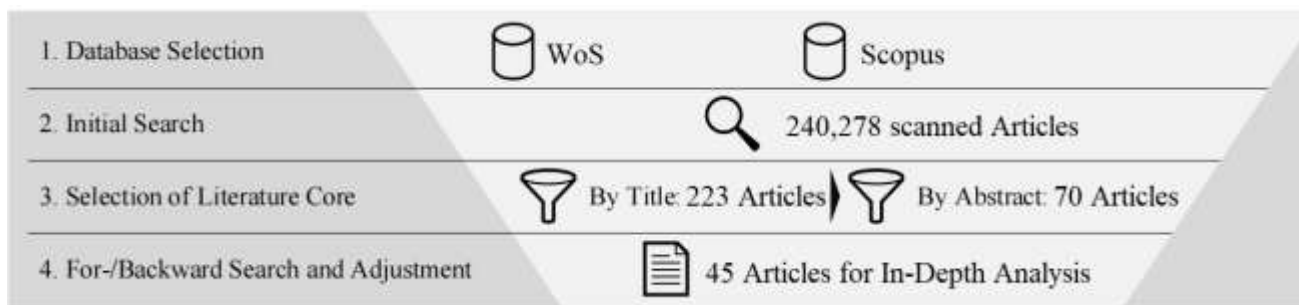


Figure 1: Visualization of the literature search process

This paper aims to address precisely this issue by developing a comprehensive characteristic synthesis of the respective concepts. We analyze of entrepreneurial and innovation ecosystem approaches and establish a conceptual foundation for understanding and delineating these ecosystems by identify relevant literature and concepts through a structured literature review. Next, to address the problem of conceptual blurring and the diverse utilization of ecosystem terminology, we construct a typology of entrepreneurial and innovation ecosystems by deriving generic characteristics from the literature. This approach enables us to focus on the broader picture and detach from intricate details, which is essential given the extensive landscape of ecosystem conceptualizations and their application (Cobben et al., 2022). Therefore, the research question of this paper is as follows:

*Research Question (RQ):*

What are the generic characteristics that can be derived from the literature to establish a unified understanding of entrepreneurial and innovation ecosystem conceptualizations?

To achieve the objective of distinguishing and differentiating between ecosystem concepts, this paper adopts the notion of ideal types. Ideal types represent a unique combination of generic characteristics derived from recent articles, chosen for their suitability as a conceptual framework to systematize abstracted and generalized conceptual knowledge. Using clustering methods, we derive idealized types of ecosystems, which serve as a valuable tool for distinguishing between entrepreneurial and innovation ecosystem concepts. By identifying the key concepts and their interrelationships, the need for a clear demarcation of the field becomes evident. Building on this initial contribution, we subsequently explore the characteristics of different types of entrepreneurial and innovation ecosystems.

The structure of the paper is as follows: First, we provide the conceptual and theoretical foundations of ecosystem theory. Next, we examine the evolution and adaptation of the term "entrepreneurial and innovation ecosystems" in the literature. This examination serves as the basis for deriving the general characteristics of both ecosystem types and discussing the typology. Finally, we conclude by summarizing the contribution and limitations of this paper.

**2.0 Ecosystem**

In recent years, there has been a significant increase in interest in the concepts of ecosystems as novel frameworks for understanding the competitive environment (Jacobides, Cennamo, & Gawer, 2018). Autio and Thomas (2021) conducted a comparative analysis of

these concepts and found that ecosystems are still in the early stages of development, with a predominant focus on the innovation subdomain within the business and management literature. Their analysis also revealed that the ecosystem concept encompasses a broader range of topics and lacks consistency and interconnectivity among authors highlighting the need for a more precise understanding of the term. Furthermore, new ecosystems that seek to transform or replace traditional methods often face resistance from reluctant stakeholders and institutions (Autio and Thomas, 2021).

The term "ecosystem" has emerged as a compelling metaphor for describing the interactions and interdependencies among multiple institutions and stakeholders. It was first introduced by Moore (1993) in the fields of business and economics, emphasizing its essential characteristic of enabling coordination among subjects that would otherwise act independently (Jacobides et al., 2018). The degree to which a system consists of relatively independent parts, known as modularity, plays a role in the emergence of ecosystems. However, for an ecosystem to thrive, a specific level of coordination among its members, controlled by the actors involved, is necessary.

The understanding that organizations rarely operate in perfectly competitive markets but often function within network structures where they play complementary roles in value creation represents a fundamental aspect of the concepts of innovation and entrepreneurship. This insight has gained significance among scholars in these fields, leading to the introduction of innovation and entrepreneurial ecosystems within their respective domains (Thomas, Sharapov, & Autio, 2018).

### 3.0 Typologization of Ecosystems

Ecosystem typologization involves grouping entities based on specific characteristics. Two approaches to classification are taxonomy and typology. This paper adopts a typology approach, deriving general ecosystem types based on deductively derived characteristics and ideal-type patterns. It aims to explain the reality and variations within ecosystems by employing abstraction and generalization. The concept of biological ecosystems serves as the foundation for ecosystems across research fields. The paper focuses on established research streams of entrepreneurial and innovation ecosystems, considering fundamental, relational, special, academic characteristic, and industrial characteristics. These areas cover aspects such as ecosystem structure, relational connectivity, openness, platform focus, geographic proximity, and value chain. Table 1 provides an overview of the findings.

## 4.0 Innovation Ecosystems

### 4.1 Fundamental characteristics

According to Walrave et al. (2018, p. 3), an innovation ecosystem is defined as a network of interdependent actors who combine specialized yet complementary resources and/or capabilities in order to co-create and deliver an overarching value proposition to end users while appropriating the gains received in the process. The primary purpose of innovation ecosystems is to achieve competitive advantages, which entities aim to accomplish by either building or expanding an ecosystem through cooperation with other actors. This knowledge exchange enables joint co-creation of innovation and the creation of new value for society. Innovation ecosystems are proactive systems that involve socio-economic actors (Aarikka-Stenroos & Ritala, 2017, p. 25).

### 4.2 Relational characteristics

Actors within innovation ecosystems are interdependent and co-evolving agents, and their interaction is characterized by a combination of collaborative and competitive structures. Asymmetric relational relationships exist within these ecosystems, favoring opportunistic behavior. Common actors in innovation ecosystems include innovators, customers, focal companies, governmental and non-governmental organizations, policymakers, suppliers, and universities (Aarikka-Stenroos & Ritala, 2017, p. 25; Dedehayir et al., 2018, p. 18).

### 4.3 Special characteristics

One key feature of innovation ecosystems is that they are often deliberately designed rather than evolving organically. Coopetition, a combination of cooperation and competition, can serve as a powerful instrument to stimulate innovation efforts. The actors within innovation ecosystems have a strong innovation-driven mindset and exhibit an innovative spirit or spirit of inquiry. Innovation ecosystems can involve national, regional, or technological innovations. They differ from business ecosystems in their focus on creating innovation independently of existing products and services, with a higher degree of uncertainty and associated costs. The degree of openness in innovation ecosystems represents a trade-off between knowledge sharing and the risk of knowledge leakage to competitors. Complementary assets in innovation ecosystems encompass knowledge, skills, and technologies. The geographical proximity of innovation ecosystems can be described in terms of spatial proximity and the presence of virtual spaces. Value co-creation is a primary focus within innovation ecosystems (Madsen, 2020, p. 4; Dedehayir et al., 2018, p. 18; Panetti et al., 2020, p. 1779).

### 4.4 Academic characteristics

Innovation ecosystems are a significant research focus within strategic management, innovation management, and entrepreneurship. Key research topics in this field include collaboration, innovation capabilities, and value co-creation. Leading researchers in the area of innovation ecosystems include (Gomes et al., 2018, p. 30; Adner & Feiler, 2019).

## 5.0 Entrepreneurial Ecosystems

### 5.1 Fundamental characteristics

Entrepreneurial ecosystems involve interconnected individuals and entities in a specific geographical area, collectively shaping the ecosystem and impacting the economy. These ecosystems evolve through interdependent components, facilitating the creation of new ventures. Stakeholders from diverse backgrounds aim to promote entrepreneurship, encompassing cultural, economic, political, and social spheres (Spigel, 2017). Entrepreneurship contributes to regional development and economic growth by identifying opportunities and managing risks in establishing businesses (O’Shea et al., 2019). The entrepreneurial ecosystem emphasizes innovation and encompasses activities like discovering, pursuing, and scaling ventures (Acs et al., 2017). Resource exchange within the ecosystem, including identifying and exploiting entrepreneurial opportunities, helps achieve ecosystem goals (Qian, 2018). "Entrepreneurship ecosystem" and "start-up ecosystem" are used interchangeably, sharing a similar understanding within the broader concept of the entrepreneurial ecosystem (Faber et al., 2019; Tripathi & Gupta, 2021). Resources exchanged include human resources, infrastructure, entrepreneurial culture, support systems, the market, demographics, and entrepreneurs or entrepreneurial teams. (Tripathi & Gupta, 2021).

### 5.2 Relational characteristics

Actors within entrepreneurial ecosystems evolve from independent entities to interdependent actors over time (Pustovrh et al., 2020). Their interactions are characterized by cooperation, mutual trust, and a shared objective, leading to symmetrical relationship structures (Audretsch & Belitski, 2017). While hierarchical differences exist, opportunistic behavior is limited due to the dependency relationship and common objective. Other ecosystem actors influence milestone setting and strategy alignment (Auschra et al., 2019). Ecosystem leaders, including aspiring entrepreneurs, accelerators, banks, business angels, incubators, investors, government agencies, venture capitalists, service providers, and universities, play a vital role in orchestrating the ecosystem (Auschra et al., 2019; Sako, 2018; Tripathi & Gupta, 2021). Government agencies specifically aim to promote and support entrepreneurship (Scaringella & Radziwon, 2018).

### 5.3 Special characteristics

Entrepreneurial ecosystems rely on the entrepreneur or entrepreneurial team for their creation and sustainability (Scaringella & Radziwon, 2018). However, the position of entrepreneurs depends on other actors within the ecosystem (Alvedalen & Boschma, 2017). Collaborative openness is crucial in entrepreneurial ecosystems, facilitating the exchange of ideas and resources (Qian, 2018). Mutual discovery and exploitation of entrepreneurial opportunities contribute to the complementary assets within the ecosystem (Audretsch et al., 2019). Geographical proximity is a common characteristic of entrepreneurial ecosystems (Brown & Mason, 2017; Spigel, 2017; Tripathi & Gupta, 2021).

### 5.4 Academic characteristics

The concept of the entrepreneurial ecosystem holds significant importance in entrepreneurship and innovation research (Song, 2019). Research on entrepreneurial ecosystems covers various dimensions, including economic, technological, cultural, and societal aspects (Song, 2019). Noteworthy studies in the entrepreneurial ecosystem literature include those conducted by Pustovrh et al. (2020), and van Rijnsoever (2020).

Table 1: Comparison of Innovation Ecosystems and Entrepreneurial Ecosystems

Innovation Ecosystems	Entrepreneurial Ecosystems
<b>Fundamental Characteristics</b>	
<b>Definition</b>	
- Innovation ecosystems are defined as "a network of interdependent actors who combine specialized yet complementary resources and/or capabilities in seeking to co-create and deliver an overarching value proposition to end users, and appropriate the gains received in the process" (Walrave et al., 2018, p. 3).	- Entrepreneurial ecosystems represent a diverse set of interdependent actors within a geographic region that influences the formation and eventual trajectory of the entire group of actors and potentially the economy as a whole. Entrepreneurial ecosystems evolve through a set of interdependent components which interact to generate new venture creation over time (Cohen, 2006, p. 2).
<b>Purpose of Existence</b>	
- Achieving competitive advantages - Economies of scale - Creating synergies - Sharing knowledge (skills and technologies) to jointly co-create innovative products and services - Sharing risks and uncertainties regarding the innovation's outcome	- Enabling the emergence and growth of new business areas - Focusing on economic wealth and generation of prosperity
<b>Core Value</b>	
- Innovation outcome such as new products or services	- Start-up formation
<b>System Structure</b>	
- Socio-economic	- Socio-economic
<b>Relational Characteristics</b>	

Innovation Ecosystems	Entrepreneurial Ecosystems
<b>Relational Connectivity</b>	
- Interconnected actors, coevolving processes	- Independent, co-existing actors
<b>Relationship Structure</b>	
- Coopetition	- Collaboration
<b>Governance Structure</b>	
- Ecosystem Orchestrator	- Ecosystem Orchestrator
<b>Actors and Roles</b>	
<ul style="list-style-type: none"> <li>- Customers</li> <li>- Focal companies</li> <li>- Governmental organizations</li> <li>- Innovators</li> <li>- Non-governmental organizations</li> <li>- Policymakers</li> <li>- Private organizations</li> <li>- Public organizations</li> <li>- Resource providers (funders)</li> <li>- Societal actors</li> <li>- Suppliers</li> <li>- Universities</li> </ul>	<ul style="list-style-type: none"> <li>- Accountants</li> <li>- Entrepreneurial teams</li> <li>- Established Firms</li> <li>- Family</li> <li>- Government</li> <li>- Individuals</li> <li>- Industries</li> <li>- Investors</li> <li>- Law firms</li> <li>- Peers</li> <li>- Supporting organizations</li> <li>- Universities</li> </ul>
<b>Special Characteristics</b>	
<b>Complementary Assets</b>	
- Complementing resources such as knowledge and skills	- The mutual discovery and exploitation of entrepreneurial opportunities
<b>Key Features</b>	
<ul style="list-style-type: none"> <li>- Enabled by information technology</li> <li>- Innovation-driven (national, regional innovation or technological innovation)</li> <li>- Uncertainties over value co-creation and value capture</li> </ul>	<ul style="list-style-type: none"> <li>- An entrepreneur acts or entrepreneurial teams act as the Centre of the business environment</li> <li>- Governments should support and sustain entrepreneurship</li> <li>- Located either in a particular geographic region or around a certain industry</li> </ul>
<b>Geographical Proximity</b>	
- Spatial proximity or/and virtual spaces	- Emerging and developing economies (country, region)
<b>Value Proposition</b>	
- Primarily refer to value co-creation	- Primarily refer to value co-creation
<b>Academic Characteristics</b>	
<b>Main Research Area</b>	
<ul style="list-style-type: none"> <li>- Entrepreneurship</li> <li>- Innovation</li> <li>- Strategy</li> </ul>	- Entrepreneurship
<b>Key Research Topics</b>	
<ul style="list-style-type: none"> <li>- Collaboration</li> <li>- Value co-creation</li> <li>- Customer-facing solutions</li> <li>- Innovation capabilities</li> <li>- Innovation hubs</li> <li>- Knowledge hubs</li> </ul>	<ul style="list-style-type: none"> <li>- Clusters</li> <li>- Governance</li> <li>- Job and wealth creation</li> <li>- Locality</li> <li>- System attributes/components</li> </ul>
<b>Leading Scholars</b>	
Adner (2017); Gomes et al. (2018); Rong et al. (2019); Walrave et al. (2018, p. 3); Aarikka-Stenroos & Ritala, (2017, p. 25); Dedehayir et al., 2018, p. 18; Madsen, 2020, p. 4; Panetti et al., 2020, p. 1779; De Bernardi et al. (2020)	Acs et al. (2017); Spigel (2017); Faber et al., 2019; Tripathi & Gupta, (2021); Shane & Venkataraman, (2000); Qian, (2018); Audretsch et al., (2019); Bischoff, (2019); Brown & Mason, (2017); Song, (2019); van de Ven (2019), Rijnsoever (2020).

(Sources:own elaboration)

## 6.0 Similarities and Differences

Entrepreneurial and innovation ecosystems extend beyond internal perspectives, utilizing support from institutions at industrial and governmental levels, leading to inflows and outflows of external knowledge (Scaringella & Radziwon, 2018). Both ecosystem share properties of complex adaptive systems, including self-organization, open but distinct boundaries, complex components, non-linearity, adaptability, and sensitivity to initial conditions (Roundy et al., 2018). Conceptualizations of innovation ecosystems often involve core elements such as actors, infrastructure, regulations, knowledge, and ideas, while identifying common dimensions with entrepreneurial ecosystems (Thomas, L. D., Sharapov, D., & Autio, E. 2018). Other than that, both ecosystems similar exist in territories with unique atmospheres, anchoring industries, and varying sizes by comprising a diverse set of stakeholders, including corporations, research institutions, universities, and government officials, emphasizing social foundations of co-existence, co-involvement, collaboration, and

competition. Finally, aim for well-defined outcomes that drive innovation, entrepreneurship, competitiveness, and economic growth. (Cobben et al. 2022).

While the differences, Entrepreneurial ecosystems focus on regions or countries involving both governmental actors and entrepreneurs, while acknowledging the contributions of individuals and institutions. Policymakers play a crucial role in supporting these ecosystems. Innovation ecosystems, on the other hand, are associated with the digital world, with diverse industries developing innovative products and services in close proximity. Uncertainty regarding supply and demand is higher in innovation ecosystems (De Bernardi, et al. 2020).

## 7.0 Conclusion

The typology presented in this paper provides a framework for understanding the similarities and differences between entrepreneurial and innovation ecosystems, offering guidance to researchers and practitioners in developing effective ecosystem management approaches. Further research could explore the interactions and interdependence between these two types of ecosystems and investigate the implications for ecosystem actors and policy. Overall, this study contributes to the literature by providing a comprehensive synthesis of entrepreneurial and innovation ecosystem conceptualizations and addressing the conceptual ambiguity of the term "ecosystem."

## 8.0 Contribution and limitation to the related field of study

The paper makes two key contributions. Firstly, it develops a set of generic characteristics for ecosystems and classifies them as either fundamental (necessary for every ecosystem) or optional. Secondly, it identifies generic types of ecosystems, dissociating them from the entrepreneurial and innovation ecosystems concept, and focusing on the essential characteristics of these generic types. This research enables the alignment of existing concepts with the proposed typology, facilitating the distinction of specific instances. However, the typology and its corresponding types have limitations. Firstly, the types are derived solely from the literature, which may overlook practice-oriented findings such as case studies. Additionally, although the typology is based on data collected through a literature review, the interpretation of the data is subjective, potentially leading other researchers to identify different characteristics. The idealized nature of the types is both advantageous and limiting, as it encourages a holistic perspective rather than an exhaustive consideration of details. Consequently, while the types offer valuable conceptual assistance for understanding and differentiating ecosystems, there is a need for tools that provide more detailed information, such as an empirical taxonomy.

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