



Understanding Innovation Ecosystems

Ilindena Sotirofski

Public Administration Department,
Aleksander Moisiu University of Durres,
Durres, Albania

Received: 19 February 2024 / Accepted: 15 March 2024 / Published: 23 March 2024
© 2024 Ilindena Sotirofski

Doi: 10.56345/ijrdv11n1o1

Abstract

In today's changing and globalized world innovation ecosystems have become drivers of economic growth and competitive advantage. These ecosystems facilitate collaboration, knowledge sharing and technological advancements, among businesses. Scholars and practitioners have increasingly focused on understanding the concept of innovation ecosystems as they play a role in the survival and growth of firms in the technology driven economy. Companies rely on product innovation to access markets and opportunities leading them to prioritize searches for innovative ideas. To create value in business landscape, industries are now emphasizing the importance of fostering ecosystems that promote collaboration among companies. This literature review aims to synthesize existing research on the innovation ecosystems with a focus on open innovation and value creation. By examining frameworks, empirical studies, and practical insights this article offers a comprehensive overview of the mechanisms, challenges and opportunities that shape these ecosystems. It also highlights the roles played by networks, regulatory frameworks and organizational capabilities in driving innovation led growth and sustainable development, within dynamic and interconnected innovation ecosystems.

Keywords: innovation, technology, business, technological advancement, innovation ecosystems

1. Introduction

Innovation ecosystems are networks of companies, universities, government organizations, and other stakeholders that work together to promote entrepreneurship, innovation, and economic development (Ding & Wu, 2018). An innovation ecosystem is a vibrant combination of individuals, activities, and artifacts, as well as the institutions and relationships that support innovative endeavors. These include both cooperative and competitive interactions, which play a crucial role in fostering innovation within groups or individuals. In this ecosystem there are components, including products, services, both physical and nonphysical resources and technological advancements. In essence, an innovation ecosystem can involve networks of actors with varying degrees of collaboration and competition, as well as systems of artifacts that interact in complementary or substitute ways, regardless of the presence of a central firm (Granstrand & Holgersson, 2020). Ecosystems can create greater value than a single organization when managed in a successful way. Collaboration and interrelation of various stakeholders, the integration of technologies and resources, and the proactive initiatives affect innovation ecosystems (Dosso, Hervás, & Vezzani, 2015).

Technological progress is a key factor in boosting corporate performance within these ecosystems. It allows firms to produce new products, streamline processes, and add value for customers. But the dynamics of innovation ecosystems are intricate, shaped by a multitude of internal and external elements that define the performance of enterprises that operate inside them as well as the innovation landscape itself. Innovation in firms varies widely in its

growth orientation and its impact on the national and regional economy. Additionally, it plays a crucial role in creating a favorable context for innovation ecosystems to thrive (Roper, Love, & Bonner, 2017). To remain competitive, companies must acquire the ability to respond promptly to market demands. Developing new complex products or services necessitates access to specialized resources and skills that companies often lack. Consequently, companies face a dilemma: invest significantly in developing these capabilities internally or leverage the resources available within an innovation ecosystem. While collaboration among companies within an innovation ecosystem was once viewed with suspicion by many Small and Medium Enterprise (SME) managers, it is now widely accepted that participation in such ecosystems grants benefits. These benefits include risk and resource sharing, integration of complementary skills, access to broader markets and knowledge. It is commonly assumed that companies operating within long-term networked structures are more effective in achieving their objectives (Abreu, 2021).

There is a lack of consensus on the definition of innovation ecosystems, thus it becomes important to research and understand the meaning and the importance of the later. This qualitative research article seeks to explore the different meanings and definitions of innovation ecosystems. Through a comprehensive examination of existing literature, the article seeks to uncover the dynamics, challenges, and opportunities inherent in innovation ecosystems, and how they influence the performance of businesses operating within them. Additionally, the article aims to identify gaps in current research and provide insights for future studies in this field.

In the first part of this paper, the introduction summarizes the main concepts related to innovation ecosystems. Subsequently, the literature review explores various aspects related to innovation ecosystems, the main drivers of technological advancement, the role of collaboration and networking, and open innovation. The methodology section describes the approach taken, followed by further discussions on innovation ecosystems, open innovation, and value creation. Finally, the paper draws conclusions and offers recommendations for the effective implementation of innovation ecosystems.

2. Literature Review

The rapid pace of technological, economic, and social change poses challenges for businesses and communities as they strive to keep up to date. The rapid pace of information and communication technologies has led to a sudden rise in digital data and the rapid expansion of the Internet. Globalization has not only further expanded the scope of economic and social activities but has also transformed innovation by recognizing a range of factors that contribute significantly to greater competitive advantage. (Fukuda, 2020). Promoting innovation has become an important responsibility of governments, universities, businesses, professionals, and civil society. It is defined as an essential tool for effectively addressing a range of economic, social, and ecological challenges, that reflect a shared commitment to improving societal coping mechanisms. Society is increasingly prioritizing innovation due to several important reasons. These include sharp competition in the global market, the need to stimulate economic growth and capitalize on technological advancements, enhance efficiency in product development and industrial processes, and address challenges such as resource scarcity, global warming, youth unemployment, and the promotion of social inclusion (Brunetti, et al., 2020). Innovation is seen as the primary driver of significant economic success within a nation. This belief reinforces efforts to shape the economic recovery strategy and advance initiatives aimed at fostering the innovation ecosystem. Notably, as high-tech sectors promise greater growth opportunities, the most effective approach to stimulate job creation and economic expansion involves reformation the transition of emerging innovations from research areas to the commercial sphere. The literature on innovation ecosystems has seen a significant increase in recent years. The innovation ecosystem concept has earned widespread attention and application across various scholarly perspectives. It has been extended to comprise a range of phenomena, including 'business ecosystems', 'technology ecosystems', 'platform ecosystems', 'entrepreneurial ecosystems', and 'knowledge ecosystems'. The varied ways in which researchers use this concept have created confusion about its meaning. This confusion could reduce the effectiveness of the concept in building up a better understanding over time. (Thomas & Autio, 2020). Innovation ecosystems have acquired widespread academic attention across various fields including innovation, business, economics, and sustainability (Costa & Matias, 2020). Innovation concentrates in sectors or regions with rapid growth, driving structural changes, especially in large urban areas (Ma & Zhu, 2022).

2.1 Innovation Ecosystems

The innovation ecosystem has roots in both the innovation system and the business ecosystem. While the concept of

innovation ecosystems is widely discussed and explored, the lack of a clear and consistent definition has led to challenges in research and understanding within the academic and professional communities. Different definitions and concepts of innovation ecosystems have been developed by labeling the term such as digital innovation ecosystem, hub ecosystem or open innovation ecosystem. The concept's flexibility could be associated with its ability to adapt to different contexts or situations. (Gomes, Facin, Salerno, & Ikenami, 2018). In various industries, there is a shift from individual products and services to more intricate value propositions achieved through the integration of complementary products and services from different players. Described as an innovation ecosystem, where actors collaborate to create, deliver, and gain value collectively, research focuses on the requirement for organizations to adopt a clear ecosystem strategy. (Walrave, Talmar, Podoyuitsyna, Romme, & Verbong, 2018).

Table 1. Selected definitions of Innovation Ecosystems in order of publication year

Author/s	Title	Innovation Ecosystems Definition
(Moore, 1993)	Predators and prey: a new ecology of competition.	"An innovation ecosystem refers to a loosely interconnected network of companies and other entities that coevolve capabilities around a shared set of technologies, knowledge, or skills, and work cooperatively and competitively to develop new products and services."
(Granstrand, 2000)	Corporate Innovation Systems: A Comparative Study of Multi-Technology Corporations in Japan, Sweden, and the USA	"The set of actors, activities, resources and institutions and the causal interrelations that are in some sense important for the innovative performance of a corporation."
(Adner, 2006)	Match your innovation strategy to your innovation ecosystem.	"The collaborative arrangements through which firms combine their individual offerings into a coherent, customer-facing solution."
(Carayannis & Campbell, 2009)	'Mode 3' and 'Quadruple Helix': toward a 21st century fractal innovation ecosystem	"A 21st Century Innovation Ecosystem is a multi-level, multi-modal, multi-nodal and multi-agent system of systems."
(Gomes, Facin, Salerno, & Ikenami, 2018)	Unpacking the innovation ecosystem construct: Evolution, gaps, and trends	"A network system consisting of the communities of governments, product enterprises, complementary products enterprises, and customers, which interact, communicate, or promote innovation in order to create valuable new products."
(Granstrand & Holgersson, 2020)	Innovation ecosystems: A conceptual review and a new definition	"The evolving set of actors, activities, and artifacts, and the institutions and relations, including complementary and substitute relations, that are important for the innovative performance of an actor or a population of actors."
(Cai, Ma, & Chen, 2020)	Higher Education in Innovation Ecosystems	"Co-innovation networks, in which actors from organizations concerned with the functions of knowledge production, wealth creation and norm control interact with each other in forming co-evolution and interdependent relations (both direct or indirect) in cross-geographical contexts, and, through which new ideas and approaches from various internal and external sources are integrated into a platform to generate shared values for the sustainable transformation of the society."

Innovation ecosystems play an essential role in driving technological advancement and promoting economic growth . These ecosystems provide favorable conditions for high-tech development and improve the efficiency of the innovation process (Gavrilyuk, 2022). Given the ongoing evolution of innovation ecosystems, the integration of social, community, and technological advancements is fundamental for achieving sustainable development and addressing global challenges (Al-Emran & Griffy-Brown, 2023).

2.2 Innovation openness and value creation

As companies grow and invest more in research and development, they attract new customers and partners, apply external knowledge, and establish long-term collaborations within innovation ecosystems. The interaction among partners within ecosystems enables coordination without strict hierarchical governance, as complementors retain decision-making autonomy while jointly producing and commercializing complex products or services (Jacobides, Cennamo, & Gawer, 2018). Encouraging active participation and maintaining a culture of openness and continuous exchange lowers barriers to identifying new ideas and initiating collaborations (Riesenera, Dolle, & Kuhn, 2019). Open innovation is a model where firms carefully utilize both internal and external knowledge flows to enhance internal innovation processes and explore

new market opportunities. This approach involves flexible organizational boundaries that allow for the integration of internal resources with external collaborators. (Costa & Matias, 2020). Managing knowledge exchange among ecosystem partners is crucial for open innovation. Collaboration within an innovation ecosystem fosters knowledge transfer and technological development. Value creation involves more than just adding a step; it necessitates a restructuring of the value creation system, redefining the roles of different actors and their relationships. The strength of the ecosystem relies on partners' commitment to joint value creation, necessitating fair value distribution to maintain dedication. Unequal gains may lead to reduced engagement and withdrawal. Therefore, fair compensation for contributions is essential to sustain the innovation ecosystem (Jacobides, Cennamo, & Gawer, 2018). Organizations consistently adjust to meet the needs of new partners and the overall ecosystem. Collaboration has a reciprocal impact, with the performance of each organization influencing others and collectively shaping the performance of the entire innovation ecosystem. In an innovation ecosystem, actors engage in intensive interactions, highlighting the importance of understanding their collaborative value creation. Interdependence among actors is significant, with decisions often made within organizational boundaries and partners viewed as potential competitors. The total value generated within the ecosystem centers on the alignment of partners' objectives, goals, and commitment to investing in unique complementary assets (Jacobides, Cennamo, & Gawer, 2018).

3. Methodology

A literature review approach was employed to identify relevant literature on innovation ecosystems, technological advancement, open innovation, and value creation. Electronic databases including Google Scholar, PubMed, Scopus, Jstor, and academic journals focusing on innovation management, entrepreneurship, and strategic management were searched using keywords such as "innovation ecosystems," "technological advancement," "value creation," "collaborative networks," "open innovation," and related concepts. The search was limited to articles published in peer-reviewed journals, conference proceedings, and scholarly books in the English language since 1993 with the central focus on the last 5 years.

3.1 Inclusion and Exclusion Criteria

Articles were included in the review if they met the following criteria:

1. Relevance to the themes of innovation ecosystems, technological advancement, open innovation, and value creation.
2. Empirical studies, theoretical frameworks, conceptual models, and case studies exploring innovation ecosystems and their implications for businesses.
3. Focus on interdisciplinary perspectives drawing from fields such as innovation management, entrepreneurship, economics, and sociology.
4. Availability of full-text articles accessible through academic databases or institutional subscriptions.
5. Articles were excluded if they were:
6. Not directly related to the central themes of innovation ecosystems, technological advancement, or open innovation.
7. Published in languages other than English.
8. Outdated or lacking relevance to contemporary discussions on innovation ecosystems.

3.2 Limitations

While efforts were made to ensure the comprehensiveness and consistency of the literature review, certain limitations should be acknowledged. Firstly, the search strategy may have overlooked relevant articles published in non-English languages or non-indexed sources. Secondly, the review focused primarily on peer-reviewed academic literature, potentially excluding valuable insights from grey literature, or practitioner-oriented publications. Finally, the interpretation of findings is subject to researcher bias and the subjective nature of qualitative synthesis methods. The paper solely conducts a literature review and does not entail the development of a novel framework for studying innovation ecosystems.

4. Discussions

The literature reveals diverse perspectives on innovation ecosystems. While some studies explore their connection to open innovation, others examine the processes of value creation and value capture within innovation ecosystems, as well as the fundamental role of actors. The exploration of innovation ecosystems provides significant observations into the dynamic interplay of various elements within these complex networks. The review synthesis emphasizes the multifaceted nature of innovation ecosystems, where actors, artifacts, and activities combine to foster collaborative innovation processes. Innovation ecosystems are dynamic structures that self-organize and evolve alongside changing market conditions. (Tolstykh, Shmeleva, & Gamidullaeva, 2020). Like entrepreneurial ecosystems, successful innovation ecosystems go through a lengthy process of evolution and may exhibit different stages of maturity. Rapid changes in the business environment and growing uncertainty push organizations to both compete and cooperate to succeed. Participants in an innovation ecosystem are interconnected and evolve together. All actors in an innovation ecosystem play a role in co-creating the ecosystem's value, which would be challenging for a single firm to achieve alone (Ianioglo, 2021). Understanding the complex relationships between these components is essential for planning effective innovation strategies and maximizing the potential of innovation ecosystems. Moreover, the review highlights the evolving nature of innovation ecosystems. Unlike static entities, these ecosystems are dynamic and adaptive, continuously responding to internal and external incentives such as technological advancements, market trends, and regulatory changes. Recognizing and embracing this dynamism is essential for organizations seeking to navigate the complexities of innovation ecosystems effectively (Oghazi, Parida, Wincent, & Mostaghel, 2022). Another key finding is the role of institutions in shaping innovation ecosystems. Regulatory frameworks, industry standards, and cultural norms play a significant role in influencing the behavior and interactions of ecosystem participants. Understanding the institutional context is paramount for fostering an environment conducive to innovation and collaboration.

5. Conclusion and Recommendations

In conclusion, through a comprehensive review of the literature, this paper has provided insights into the function, and significance of innovation ecosystems in contemporary business environments. By leveraging collaborative networks, regulatory frameworks, and organizational capabilities, businesses can join the transformative power of technology to drive innovation, foster economic growth, and create shared value within dynamic and interconnected innovation ecosystems. However, navigating the complexities of innovation requires a multifaceted approach that integrates technological expertise, strategic foresight, and a commitment to ethical and socially responsible innovation practices.

Some suggestions that can be considered about the innovation ecosystems are:

1. As innovation ecosystems continue to evolve, organizations must adapt and embrace change to remain competitive and resilient in an increasingly interconnected and rapidly changing global economy. It is important to recognize the role of institutions in shaping the behavior and interactions of ecosystem participants and advocate for supportive regulatory frameworks and industry.
2. In this era of globalization and open innovation techniques, policy leaders need to guarantee democratic access to information and technology. Changes in policy will require businesses and entrepreneurs to engage in co-creation. The secret to encouraging networks over individual businesses and fostering market competitiveness is open innovation.
3. The new innovation strategy has to give up on the idea that big businesses are the center of attention and take into account the roles that human capital, competitiveness, funding, intellectual property, and open data play in fostering an open innovation ecosystem that includes smaller businesses.
4. A more comprehensive stakeholder approach is needed to develop an open innovation framework with a focus on sustainability. Governments need to support creative approaches that unleash hidden potential, concentrate on issues that are relevant to the area, and provide road maps that will transform society.

References

- Abreu, A. (2021). Innovation Ecosystems: A Sustainability Perspective. *Sustainability*, 13(4), 1675. doi:<https://doi.org/10.3390/su13041675>
- Adner, R. (2006). Match your innovation strategy to your innovation ecosystem. *Harvard Business Review*, 84(4), 98-107.
- Al-Emran, M., & Griffy-Brown, C. (2023). The role of technology adoption in sustainable development: Overview, opportunities, challenges, and future research agendas. *Technology in Society*, 102240. doi:<https://doi.org/10.1016/j.techsoc.2023.102240>

- Brunetti, F., Matt, D. T., Bonfanti, A., Longhi, A. D., Pedrini, G., & Orzes, G. (2020). Digital transformation challenges: strategies emerging from a multi-stakeholder approach. *The TQM Journal*, 32(4). Retrieved from <https://www.emerald.com/insight/content/doi/10.1108/TQM-12-2019-0309/full/html>
- Cai, Y., Ma, J., & Chen, Q. (2020). Higher Education in Innovation Ecosystems. *Sustainability*, 12(11), 4376. Retrieved from <https://www.mdpi.com/2071-1050/12/11/4376>
- Carayannis, E. G., & Campbell, D. F. (2009). 'Mode 3' and 'Quadruple Helix': toward a 21st century fractal innovation ecosystem. *International Journal of Technology Management*, 46(3/4), 201-234. doi:<https://doi.org/10.1504/ijtm.2009.023374>
- Costa, J., & Matias, J. C. (2020). Open Innovation 4.0 as an Enhancer of Sustainable Innovation Ecosystems. *Sustainability*, 12(19). doi:<https://doi.org/10.3390/su12198112>
- Ding, L., & Wu, J. (2018). Innovation ecosystem of CNG vehicles: a case study of its cultivation and characteristics in Sichuan, China. *Sustainability*, 10(1), 39. doi:<https://doi.org/10.3390/su10010039>
- Dosso, M., Hervás, F., & Vezzani, A. (2015). Leading R&D Investors for the Dynamics of. IRC Policy Brief (pp. 1-10). Seville, Spain: Institute for Prospective Technological Studies .
- Fukuda, K. (2020). Science, technology and innovation ecosystem transformation toward society 5.0. *International Journal of Production Economics*, 220, 107460. doi:<https://doi.org/10.1016/j.ijpe.2019.07.033>
- Gavrilyuk, A. V. (2022). Strategic Opportunities for the Development of Innovative Ecosystem. *Startegizing: Theory and Practice*, 2(3).
- Gomes, L. A., Facin, A. L., Salerno, M. S., & Ikenami, R. K. (2018). Unpacking the innovation ecosystem construct: Evolution, gaps and trends. *Technological Forecasting and Social Change*, 30-48. doi:<https://doi.org/10.1016/j.techfore.2016.11.009>
- Granstrand, O. (2000). Corporate innovation systems: a comparative study of multi-technology corporations in Japan, Sweden and the USA. Göteborg, Sweden: Chalmers University of Technology Industrial Management and Economics. Retrieved from https://www.lem.sssup.it/Dynacom/files/D21_0.pdf
- Granstrand, O., & Holgersson, M. (2020). Innovation ecosystems: A conceptual review and a new definition. *Technovation*, 90-91, 102098. doi:<https://doi.org/10.1016/j.technovation.2019.102098>
- Hoffecker, E. (2019). *Understanding Innovation Ecosystems: A Framework for Joint Analysis and Action*. Cambridge, MIT D-Lab.
- Ianioglo, A. (2021). Innovation and Entrepreneurial Ecosystems. *Innovation, Research and Development and Capital Evaluation*. doi:[10.5772/intechopen.102344](https://doi.org/10.5772/intechopen.102344)
- Jacobides, M. G., Cennamo, C., & Gawer, A. (2018). Towards a theory of ecosystems. *Strategic Management Journal*, 39(8), 2255-2276. doi:<https://doi.org/10.1002/smj.2904>
- Ma, D., & Zhu, Q. (2022). Innovation in emerging economies: Research on the digital economy driving high-quality green. *Journal of Business Research*, 145, 801-813. doi:<https://doi.org/10.1016/j.jbusres.2022.03.041>
- Moore, J. F. (1993). Predators and Prey: A New Ecology of Competition. *Harvard Business Review*, 71(3), 75-86.
- Munos, P., & Cohen, B. (2017). Sustainable Entrepreneurship Research: Taking Stock and looking ahead. *Business Strategy and the Environment*, 300-322. doi:<https://doi.org/10.1002/bse.2000>
- Oghazi, P., Parida, V., Wincent, J., & Mostaghel, R. (2022). Ecosystems transformation through disruptive innovation: A definition, framework and outline for future research. *Journal of Business Research*, 147, 16-26. doi:<https://doi.org/10.1016/j.jbusres.2022.03.073>
- Riesenera, M., Dolle, C., & Kuhn, M. (2019). Innovation Ecosystems for Industrial Sustainability. 26th CIRP Life Cycle Engineering (LCE) Conference, (pp. 27-32). Retrieved from <https://pdf.sciencedirectassets.com/282173/1-s2.0-S2212827119X00037/1-s2.0-S221282711930037X/main.pdf?X-Amz-Security-Token=IQoJb3JpZ2luX2VjEC8aCXVzLWVhc3QtMSJHMEUCIQDp3mQr%2FCOKReU%2Bo9EUllqFTwoxdZhsIQqZPPQpol92CgIgpZvVJoXhXxDcUaQJ8mUnNR83bgSjM8w8q3jL24M>
- Roper, S., Love, J. H., & Bonner, K. (2017). Firms' knowledge search and local knowledge externalities in innovation performance. *Research Policy*, 43-56. doi:<https://doi.org/10.1016/j.respol.2016.10.004>
- Thomas, L. D., & Autio, E. (2020). Innovation Ecosystems. SSRN, 1-39. doi:<http://dx.doi.org/10.2139/ssrn.3476925>
- Tolstikh, T., Shmeleva, N., & Gamidullaeva, L. (2020). Evaluation of Circular and Integration Potentials of Innovation Ecosystems for Industrial Sustainability. *Sustainability*, 12(11), 4574. doi:<https://doi.org/10.3390/su12114574>
- Walrave, B., Talmar, M., Podoynitsyna, K. S., Romme, A. G., & Verbong, G. P. (2018). A multi-level perspective on innovation ecosystems for path-breaking innovation. *Technical Forecasting and Social Change*, 103-113. doi:<https://doi.org/10.1016/j.techfore.2017.04.011>