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Biblioshiny-Based Knowledge Mapping of Entrepreneurship and SMEs in Innovation Ecosystems

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Abstract
This study aims to map the intellectual landscape of research on entrepreneurship and small and medium-sized enterprises (SMEs) within multi-stakeholder innovation ecosystems using a bibliometric approach through Biblioshiny. A total of 38 Scopus-indexed articles published between 2010 and 2025 were analyzed to identify publication trends, thematic structures, conceptual evolution, and collaborative research patterns. The findings reveal a significant increase in scholarly attention to the topic, particularly after 2020, driven by the growing relevance of collaborative innovation, digital transformation, and ecosystem-based approaches to SME development. Key themes emerging from the knowledge mapping include entrepreneurial ecosystems, open innovation, sustainability, SMEs' innovation capabilities, and multi-actor collaboration involving government, academia, industry, and community. The study highlights Brazil, Spain, the United Kingdom, and Australia as major contributors, with notable participation from emerging economies such as Indonesia. Three-field plots, thematic maps, and co-occurrence networks indicate that current research increasingly integrates theoretical foundations of innovation systems with contemporary issues such as digitalization and green entrepreneurship. This study contributes to the literature by offering a comprehensive overview of global research patterns and identifying thematic gaps that provide strategic directions for future studies on ecosystem-based SME development.
Keywords: Bibliometric Analysis, Entrepreneurship, Innovation Ecosystem, Multi stakeholder Collaboration, SMEs.

INTRODUCTION

Small and medium enterprises (SMEs) are essential for economic growth, innovation, and job creation globally. They are recognized for their flexibility, adaptability, and significant contribution to technological advancement and economic development (Govori, 2013; Mei et al., 2019; Nor, 2024). However, SMEs often face challenges such as limited resources, access to finance, and the need for strong inter-company relationships to enhance their innovation capabilities (Mei et al., 2019; Radziwon et al., 2019; Vijayalakshmi et al., 2025).

A conducive entrepreneurial ecosystem (EE) is essential for the success of SMEs. The ecosystem includes a wide range of stakeholders such as government entities, financial

institutions, educational institutions, and supporting organizations that collaborate to drive economic growth and innovation (Arif et al., 2025; Chandana et al., 2024). The effectiveness of these ecosystems depends on the dynamic interaction between these stakeholders and the prevailing cultural and regional contexts (Arif et al., 2025; Chandana et al., 2024). Innovation is the main driver of SME performance. SMEs often rely on open innovation and collaborative efforts with external partners to complement their internal innovation activities (Mei et al., 2019); (Radziwon et al., 2019). The connection between entrepreneurship, SMEs, and multi-stakeholder ecosystems is explained through the lenses of Innovation Systems and Open Innovation, which emphasize that the success of SME innovation heavily depends on dynamic interactions within the entrepreneurial ecosystem to overcome internal resource constraints (Oliveira et al., 2025).

The relationship between SMEs and their partners, including leading organizations and service intermediaries, significantly affects the performance of their innovations (Mei et al., 2019). In addition, sustainable digital innovation and green entrepreneurship are emerging as important factors in boosting SME development and addressing environmental challenges (Jan et al., 2025). Despite their potential, SMEs face several challenges, including resistance to change, short-term focus, and difficulties in accessing advanced technologies 8. Financial constraints and limited access to timely and adequate credit are also significant obstacles to SME growth (Govori, 2013; Radziwon et al., 2019). However, the proactive role of financial institutions, government support, and strategic collaboration can mitigate these challenges and foster a supportive entrepreneurial ecosystem (Govori, 2013; Radziwon et al., 2019).

This research aims to map the landscape of entrepreneurial and SME knowledge in a multi-stakeholder innovation ecosystem using Biblioshiny. By analyzing the linkages between various factors such as entrepreneurial orientation, innovation, and ecosystem dynamics, this study seeks to provide insights into the mechanisms that drive the performance and sustainability of SMEs in different regional and cultural contexts (Arif et al., 2025; Jan et al., 2025; Ndubisi et al., 2012; Radziwon et al., 2019). Understanding the complex interactions in the entrepreneurial ecosystem and the role of innovation and collaboration is essential to improve SME performance. This research will contribute to the development of strategies that support SMEs in overcoming their challenges and harnessing their potential for economic and technological advancement (Arif et al., 2025; Govori, 2013; Jan et al., 2025; Mei et al., 2019; Radziwon et al., 2019; Vijayalakshmi et al., 2025).

While previous bibliometric studies on entrepreneurial ecosystems and SME innovation have primarily focused on publication trends or isolated thematic clusters, they often overlook the integrated interactions among multiple ecosystem stakeholders. This study

differentiates itself by providing an integrative bibliometric mapping that simultaneously examines entrepreneurial orientation, innovation, and ecosystem dynamics within a multi-stakeholder framework. Using Biblioshiny, the research reveals not only the intellectual structure of the field but also the evolving relationships among key actors influencing SME performance and sustainability across diverse regional contexts.

This study contributes theoretically by consolidating fragmented literature into a coherent ecosystem-based perspective, while highlighting emerging themes such as digital sustainability and green entrepreneurship. From a policy standpoint, the findings offer insights for designing more collaborative and inclusive ecosystem interventions. Additionally, the results identify research gaps and future directions that can guide subsequent empirical studies on SME innovation and entrepreneurial ecosystems.

LITERATURE REVIEW

Small and Medium Enterprises (SMEs) are widely recognized as important drivers of economic growth and social development. They contribute significantly to job creation, GDP, and technological innovation. This literature review explores a range of factors influencing SME innovation performance and capabilities, with a focus on collaboration networks, entrepreneurial competencies, and external stakeholder engagement (Frackiewicz, 2018; Hin et al., 2005; Meshram et al., 2019).

The research identified several factors of SME success, categorized into entrepreneurial and corporate factors, motivational factors, and managerial and environmental factors. Key factors include the need for achievement, education level, financial resources, managerial ability, and government support (Meshram et al., 2019). These elements are essential to encourage entrepreneurship and improve the performance of SMEs. Collaboration networks play an important role in improving the innovation performance of SMEs. Studies show that formal and informal collaboration networks have a positive impact on innovation, with informal networks offering greater benefits (Lu et al., 2022). Collaborations with universities, research centers, and other companies also significantly improve product innovation and overall innovation performance (D'Angelo et al., 2020). In addition, the international collaboration network, supported by entrepreneurial orientation and government institutional support, further enhances innovation outcomes (Lu et al., 2024) .

Effective engagement with external stakeholders, including customers, suppliers, and government agencies, is critical for SMEs. Stakeholder pressure, especially from governments, competitors, and customers, drives the adoption of green innovations, contributing to sustainability goals (Ahmad, 2025). In addition, SMEs benefit from engaging in open

innovation processes within regional ecosystems, leveraging knowledge from various partners to overcome resource constraints and drive innovation (Mei et al., 2019b; Radziwon et al., 2019; Shahzad et al., 2025):. Entrepreneurial competence and leadership significantly affect the performance of SMEs. Competencies in areas such as practical experience, knowledge, and social networks have a positive impact on the vitality and growth of SMEs (Fanti, 2011).

Entrepreneurial intent and resilience are also important, with training and development programs recommended to enhance these competencies (Fiernaningsih et al., 2024). Of importance, SMEs face challenges such as stiff competition, global market penetration, and rapid technological advancements (Fiernaningsih et al., 2024). To address this, SMEs must focus on building flexible and adaptive organizational structures, improving collaboration networks, and engaging stakeholders effectively (Ong et al., 2010). Policymakers should design targeted incentives to support SME sustainability initiatives and foster an environment conducive to innovation (Ahmad, 2025).

SMEs are an integral part of economic and social development, with collaboration networks, stakeholder engagement, and entrepreneurial competence being key drivers of their success. By leveraging these factors, SMEs can improve their overall innovation performance, resilience, and competitiveness in the global marketplace.

Table 1. Summary Table

Factors	Impact on SMEs	Supporting Studies
Success Factors	Enhance entrepreneurship and performance	(Meshram et al., 2019)
Collaboration Networks	Boost innovation performance	(Apa et al., 2021; D'Angelo et al., 2020; Lu et al., 2024)
Stakeholder Engagement	Drive green innovation and sustainability	(Ahmad, 2025; Mei et al., 2019a; Shahzad et al., 2025)
Entrepreneurial Competence	Improve SME vitality and growth	(Fiernaningsih et al., 2024; Zhang et al., 2013)
Challenges	Address competition and technological advancements	(Fiernaningsih et al., 2024; Radziwon et al., 2019b)

Source: processed data (2025)

This study integrates Entrepreneurial Ecosystem (EE) Theory and Innovation Systems (IS) Theory as a unified conceptual framework to dissect the dynamics of SME development within multi-stakeholder innovation ecosystems. The IS Theory provides the foundation for analyzing systemic interactions among actors government, academia, industry, and community which are mapped through social structure indicators, such as co-authorship networks and the distribution of international affiliations. Simultaneously, EE Theory emphasizes the environmental support and internal capabilities that influence entrepreneurial vitality, operationalized through conceptual structure analysis using keyword co-occurrence to track thematic evolutions from traditional innovation toward digitalization and green

entrepreneurship. By synergizing these theories, this study synthesizes the existing literature into three analytical dimensions intellectual, conceptual, and social ensuring that the Biblioshiny results reflect a broader paradigm shift from rigid systems toward a collaborative, adaptive, and sustainable entrepreneurial ecosystem for SMEs.

METHODS

This study uses a bibliometric quantitative approach to map the development of knowledge related to entrepreneurship and SMEs in the context of a multi-stakeholder innovation ecosystem. The data was collected from the Scopus database, which was selected for its wide coverage of international publications and its consistency in indexing reputable articles, and the search process is carried out using Boolean formulas. The initial search yielded 59 documents, then filtered by document type and language, namely only scientific articles and only English-language ones, resulting in 38 articles as the final dataset.

The dataset was downloaded in BibTeX format and analyzed using Biblioshiny, the interface of the Bibliometrix package on R. Analysis was carried out descriptively to assess the characteristics of publications, research trends, and intellectual structures in the study area. The analysis process includes tracking annual publication trends, journal and country distribution, author collaboration networks, and linkages between concepts through keyword co-occurrence, co-citation, and co-authorship. In addition, knowledge mapping is also carried out through conceptual structure maps, thematic maps, and thematic evolution to identify the main theme clusters and the dynamics of research development over time. The entire network visualization and knowledge map is generated directly from the Biblioshiny bibliometric module to ensure consistency of analysis.

The bibliometric approach was chosen because it provides a high level of objectivity and repeatability, where the entire steps of data collection, selection, and processing can be replicated by other researchers. Thus, this research is able to present a comprehensive overview of the global research landscape related to entrepreneurship, SMEs, and multi-stakeholder innovation ecosystems, as well as identify the direction of development of relevant research themes for future studies.

RESULTS AND DISCUSSION

1. General Characteristics of Datasets

Bibliometric analysis of 38 selected articles shows that research on entrepreneurship and SMEs in the context of the multi-stakeholder innovation ecosystem has experienced significant development throughout the period 2010–2025. The dataset came from 33

publication sources, involved 122 authors, and generated 350 references. The high number of author's keywords (169 keywords) indicates that this topic is developing with diverse and multidisciplinary themes.

The average citations per document (28.16) shows that articles in this domain have a strong level of scholarly influence. In addition, the average age of the document of 3.74 years indicates that the literature used is relatively new and relevant to contemporary issues regarding the innovation and entrepreneurship ecosystem. The level of collaboration is also quite high, as seen from the International Co-Authorship of 26.32% and an average of 3.34 authors per article, which shows that research on this topic tends to be carried out through collaboration across institutions and countries. this overview shows that research related to entrepreneurship SMEs innovation ecosystems is a rapidly growing, collaborative field, and has high scientific appeal in the global academic community.

Figure 1. General Characteristics of Datasets

2. Annual Scientific Production Trends

The Annual Scientific Production picture shows a pattern of research growth that fluctuates but increases over time. In the early period (2010–2015), the number of publications was very low, ranging from 0–1 articles per year. This indicates that the issue of integrating entrepreneurship, SMEs, and multi-stakeholder innovation ecosystems is still relatively new and has not been the main focus of research.

The increase began to be seen after 2018, marked by an increase in the number of publications to 1–2 articles per year. A significant spike occurred in 2020, where publication output increased drastically to more than 5 articles per year. This trend continued in the following years, with the peak of contributions occurring in 2021 and 2023. This increase can be attributed to the increasing attention to the role of innovation ecosystems in post-pandemic economic recovery, as well as the importance of multi-stakeholder collaboration in supporting SME sustainability and innovation. Although there will be slight fluctuations in 2024–2025, the overall trend shows long-term growth with an annual growth rate of 11.33%. This positive

growth confirms that research topics are getting wider attention, both in policy discourse and academic research.

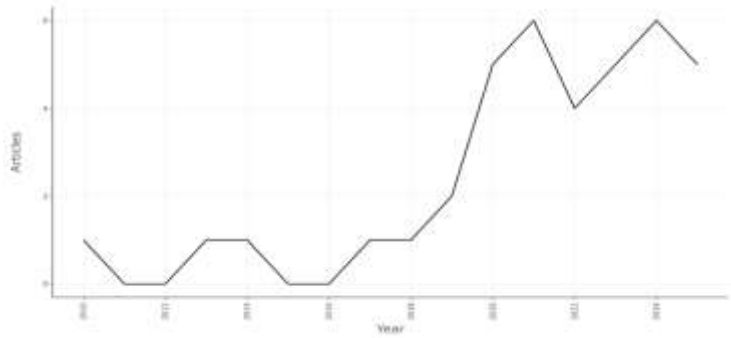

Figure 2. Annual Scientific Production

From these two visualizations, it can be seen that research on multi-stakeholder innovation ecosystems involving entrepreneurship and SMEs is in a stable growth phase. The high rate of citations per document reflects the relevance and contribution of literature to the development of the theory and practice of the innovation ecosystem. In addition, academic actors from various countries are actively involved, as reflected in the high proportion of international co-authorship. These findings also indicate that the issue of multi-stakeholder collaboration is increasingly important in line with the complexity of economic and innovation challenges, so research in this area has the potential to grow in the coming years.

The remarkable surge in publication growth observed after 2020 is not merely a statistical coincidence but reflects a profound causal shift in the global research and policy landscape. This trajectory is driven by three converging forces. First, there is a fundamental transition in innovation policy, where governments have shifted from supporting isolated firms to fostering multi-stakeholder ecosystems involving academia, industry, and communities. Second, the COVID-19 pandemic acted as a powerful catalyst for digital entrepreneurship, forcing SMEs to accelerate their digital transformation to ensure business resilience and survival in a volatile market. Lastly, the global "Green Transition" and the push for Sustainable Development Goals (SDGs) have integrated sustainability into the core of entrepreneurial research, giving rise to "green entrepreneurship" and eco-innovation as essential survival strategies for SMEs in a resource-constrained world. Consequently, the increasing literature reflects a move toward a systemic perspective where SME performance is no longer viewed in isolation but as a product of collective efficiency within a digitalized and sustainable innovation ecosystem.

3. Three-Field Plot Analysis (CR–AU–KW)

Three-field plots describe the relationship between the most used references (cited references (CR), the most productive authors (authors/AU), and the main keywords that appear in the publication (keywords/KW). This visualization shows how theoretical foundations, research actors, and thematic focuses are interconnected in the literature on entrepreneurship, SMEs, and multi-stakeholder innovation ecosystems. The results of the analysis show that the articles that are key references mostly discuss the concepts of innovation, entrepreneurship, open innovation, and innovation systems, such as the works of Amit, Edwards, as well as classic references related to innovation systems and business innovation. These references are the main foundation that forms the intellectual structure of research in this topic.

On the central side, it can be seen that some writers such as Piqué, Bersani, and De Carvalho are contributors who often connect the classic literature with the latest research developments. This shows that their contributions act as bridge authors between basic theory and mapping contemporary themes regarding innovation ecosystems. The keyword column shows that the dominant research focus revolves around "innovation ecosystem", "entrepreneurship", "SMEs", "entrepreneurial ecosystem", and "digital transformation". This strong relationship between the author and the keyword confirms that research in this field is multidimensional, covering aspects of innovation, digitalization, multi-actor collaboration, and entrepreneurial dynamics in the context of SMEs. The pattern of relationships in the three-field plot shows that research in this domain has evolved from the foundations of innovation systems theory to applicable themes such as entrepreneurial ecosystems and multi-stakeholder innovation frameworks, with the author's contribution acting as a liaison in expanding the scope of the study.

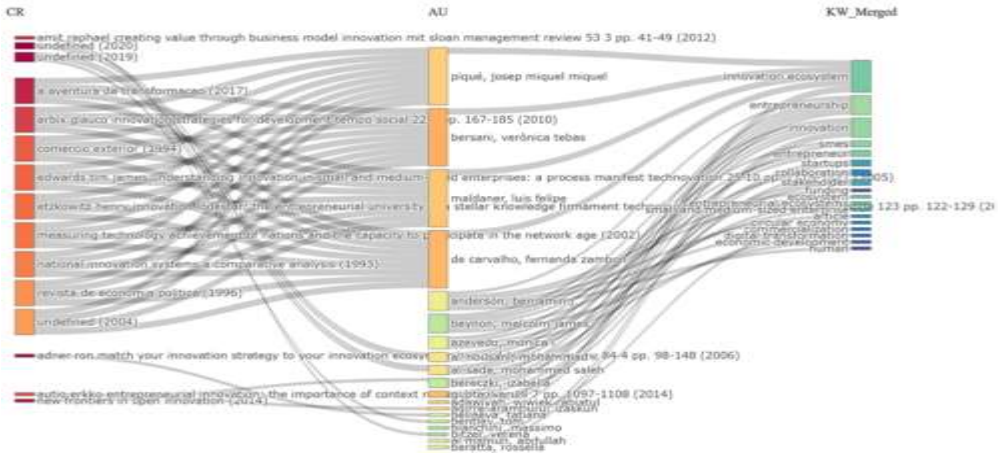

Figure 3. Three Field Plot

4. Analysis Most Relevant Sources

The results of the analysis of publication sources show that this topic has been published in various reputable international journals, with a relatively dispersed distribution. Sustainability (Switzerland) became the most productive journal with 4 articles, showing that the issue of entrepreneurship–SMEs–innovation ecosystems is closely related to the sustainability dimension and the multi-stakeholder approach that is the focus of the journal. Other journals that are also quite influential are the European Journal of Innovation Management and Praksis, each publishing 2 articles. This shows that this topic is closely related to the field of innovation management and industrial policy, so journals that focus on innovation and management become the dominant publication outlets.

Meanwhile, other journals such as the Asian Journal of Technology Innovation, Cogent Business and Management, Entrepreneurship and Regional Development, and Creative Industries Journal contributed 1 article each. This distribution pattern indicates that research on the SME innovation ecosystem is widely published across fields, ranging from management, innovation policy, regional studies, to the creative industry. These findings show that the topics of entrepreneurship and multi-stakeholder innovation ecosystems have a multidisciplinary scope, and are of interest to journals that focus on innovation, sustainability, public policy, and regional development. The existence of publications in various reputable outlets is also an indicator that this field is growing and has high academic relevance.

Figure 4. Most Relevant Sources

5. Sources' Production Over Time

The analysis of Sources' Production Over Time shows an increasing pattern of publications related to the topics of entrepreneurship, SMEs, and multi-stakeholder innovation ecosystem. Based on Biblioshiny's visualization, publication sources began to make significant contributions since 2012, marked by the appearance of the first articles in several journals such as the Asian Journal of Technology Innovation and the Creative Industries Journal. This early

period describes a phase of concept exploration that then developed in line with the increasing interest of academics in the issue of the innovation ecosystem.

The peak of publication growth occurred after 2020, where several sources showed a significant spike, notably Sustainability (Switzerland), Technological Forecasting and Social Change, and Cogent Business and Management. This reflects two important phenomena:The development of entrepreneurship and MSME research towards a more systemic perspective, which sees entrepreneurship no longer as a single actor but part of a multi-stakeholder ecosystem.The COVID-19 pandemic has encouraged research on MSME resilience, digitalization, and collaboration between the public and private sectors, so that publications in this field will increase dramatically in the 2021 2024 period.Publication trends indicate that the topic is developing into an established research area with steady cumulative growth year over year. The surge in production in the 2020–2025 period confirms that the topic of the multi-stakeholder innovation ecosystem has an increasingly strong empirical and theoretical relevance, especially when it is associated with the sustainability of MSMEs and the dynamics of modern entrepreneurship.

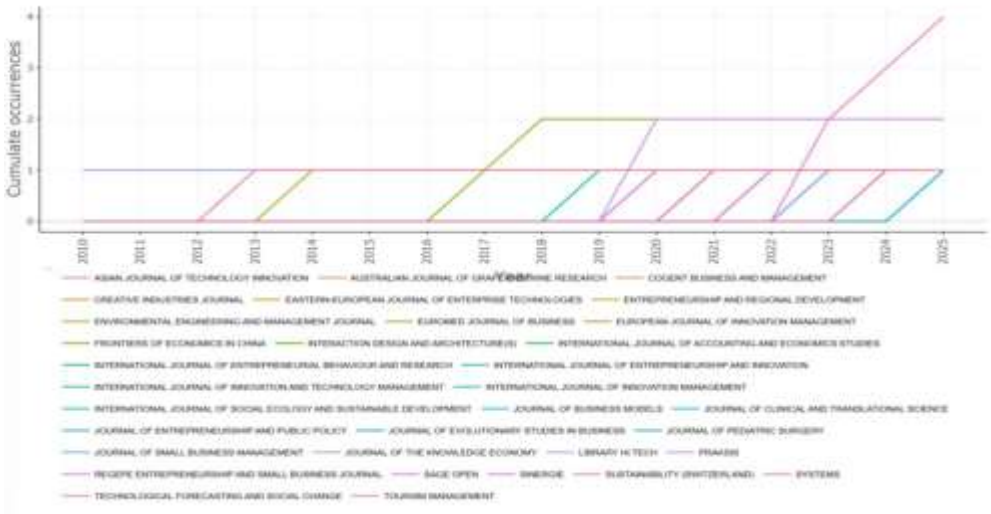

Figure 5. Sources Production Overtime

6. Most Relevant Affiliations

The Most Relevant Affiliations analysis shows that research on the theme of entrepreneurship, MSMEs, and multi-stakeholder innovation ecosystems is sourced from geographically diverse academic institutions and has a relatively strong research focus in the field of innovation and business development. The institution with the largest contribution is the Universidade Federal do Rio Grande do Sul (Brazil) with 8 articles, placing it as the most prolific affiliate on this dataset.

The dominance of Brazilian institutions is in line with research trends in the Latin American region that examine collaboration between local governments, local communities, and the small business sector in supporting innovation and regional development. In the next position are the Center for Applied Economics and Strategy, Universidade Portucalense Infante D. Henrique, and Jenderal Soedirman University, each with 5 articles. The presence of universities in Indonesia in the top group shows that research on MSMEs and ecosystem-based entrepreneurship is growing in developing countries, especially considering the role of MSMEs as the main pillar of the national economy.

Institutions such as Maastricht University, Politecnico di Milano, and Hamad Bin Khalifa University also appear as significant contributors with 3–4 publications. The lack of centralization in one region indicates that this topic has a global, multidisciplinary, and cross-country context.The dominance of universities and research institutions on this list illustrates that: he issue of multi-stakeholder innovation ecosystem is a research area that is widely studied by academics across countries.Institutional collaboration is important, as can be seen from the many countries that contribute to the literature.Developing and developed countries have relatively balanced attention, signaling the global relevance of the topic of MSMEs and entrepreneurship in the innovation ecosystem.These results underscore the importance of scientific networks and international collaborations to strengthen theoretical frameworks and practice implementation in the development of MSMEs based on collaboration between stakeholders.

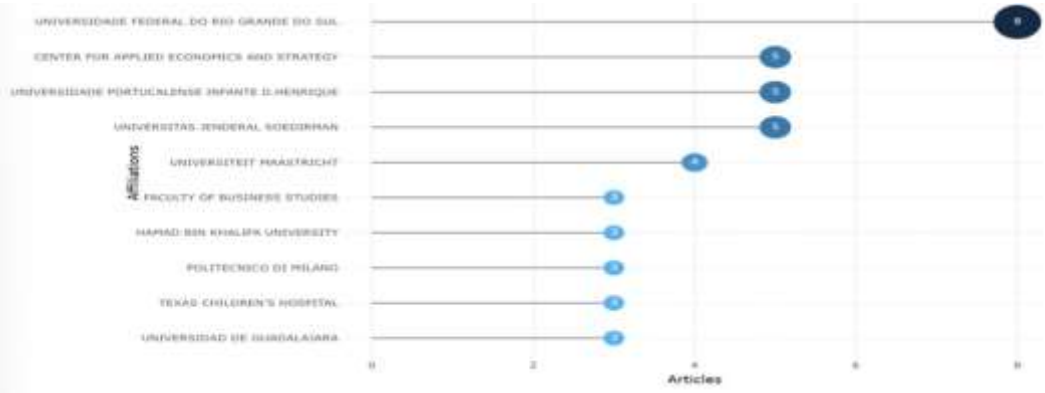

Figure 6. Most Relevant Affiliations

7. Affiliate Production from Time to Time

Bibliometric analysis using Biblioshiny shows that the contribution of publications related to the theme of entrepreneurship and SMEs in the context of the multi stakeholder innovation ecosystem has begun to increase significantly since 2020. The "Affiliations' Production over Time" graph confirms that prior to that year there was almost no publication

activity from identified affiliates. The relatively simultaneous increase in production in 2020–2023 indicates that this topic is starting to gain greater attention from various research institutions in different countries. In addition, there is a variation in the level of productivity between affiliates, which can be seen from the number of articles published in a short period. The rapid upward phase reflects the intensification of research and institutional collaboration oriented to knowledge mapping in the field of innovation ecosystem.

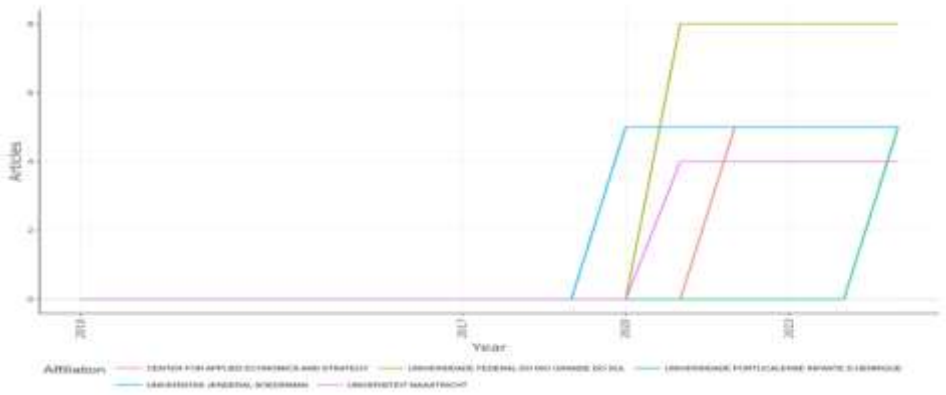

Figure 7. Affiliations Production over time

8. Corresponding Author's Countries

The "Corresponding Author's Countries" graph provides an overview of the geographical distribution of authors who contribute the most to publications related to the research topic. The country with the highest contribution is Spain, followed by Brazil, the United Kingdom, Australia, and China. The dominance of these countries shows that research on innovation ecosystems with multi-stakeholder involvement is still largely spearheaded by countries with strong research activities and academic capacity. The combination of Single Country Publications (SCP) and Multiple Country Publications (MCP) shows that there is a fairly active pattern of international collaboration. For example, countries such as Spain and Brazil display a relatively high proportion of MCPs, indicating that research in the region tends to be conducted through cross-border collaborative networks. This pattern is consistent with the characteristics of the innovation ecosystem which is basically collaborative, so that research is also reflected in the form of international academic cooperation.

Other countries such as Italy, Portugal, Austria, France, India, Indonesia, Kazakhstan, Malaysia, and Turkey also contributed albeit in smaller amounts. This shows that the discourse on entrepreneurship and MSMEs in the innovation ecosystem has reached an increasingly wide area, although it is still dominated by countries with greater research capacity.

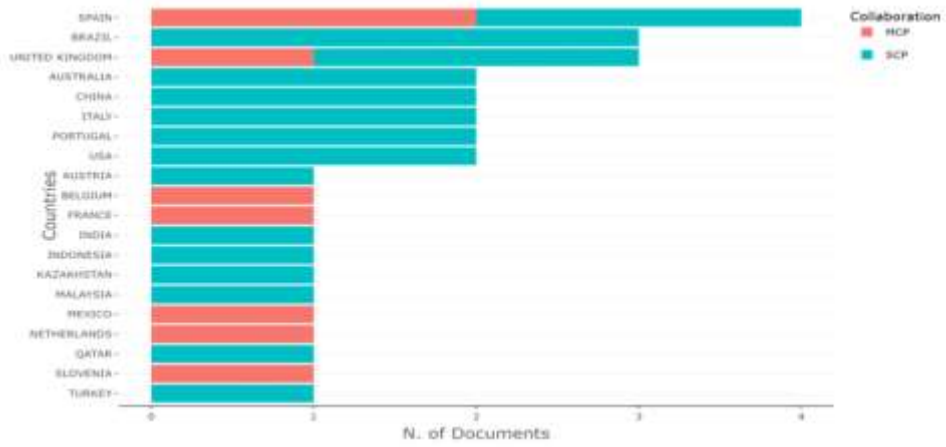

Figure 8. Corresponding Author's Countries

9. Corresponding Author's Countries

Scientific production maps show the geographical distribution of countries that contribute to publications related to the topic of entrepreneurship, MSMEs, and multistakeholder innovation ecosystems. This visualization confirms the uneven pattern of scientific production, where most publications are concentrated in a few countries with large research capacity. The country that stands out the most in scientific production is Brazil, which appears in the darkest blue, signaling the highest number of publications in the dataset.

Brazil's high contribution shows that the issue of entrepreneurship and the role of MSMEs in the innovation ecosystem is a major concern in the country, especially in the context of strengthening competitiveness and innovation-based economic development strategies. In addition to Brazil, countries such as the United States, Canada, the United Kingdom, Spain, Portugal, Italy, China, Australia, as well as several Southeast Asian countries including Indonesia show moderate levels of scientific production.

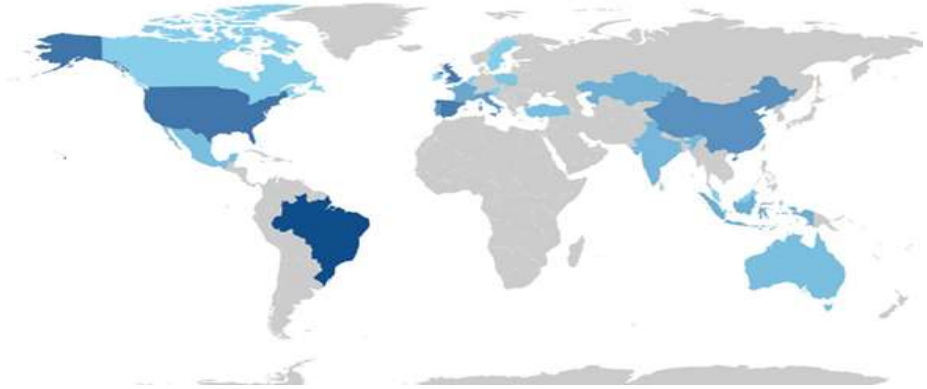

Figure 9. Countries cientific Production

10. Production of State Publications from Time to Time

The "Countries' Production over Time" figure shows the dynamics of the contribution of publications of countries involved in the study of entrepreneurship, MSMEs, and innovation ecosystems. In general, the pattern of publication production shows a significant increase after 2020. This can be attributed to the increasing global attention to MSME resilience, digital transformation, and multistakeholder collaboration post-pandemic. China and the USA showed the sharpest surge after 2020.China experienced a drastic increase in publications, signaling the growth of innovation-related research and a very strong entrepreneurial ecosystem in recent years. The United Kingdom maintained a relatively stable upward trend since before 2020, but experienced an acceleration in production in the 2021–2023 period, in line with national policies on innovation clusters and knowledge transfer partnerships. Spain and Brazil showed gradual but consistent improvements.

The increase indicates the involvement of the two countries in the development of community-based entrepreneurship models and multi-stakeholder partnerships.Malaysia and Indonesia began to show increased contributions in the 2021–2023 period. This increase reflects the growing interest in research in Southeast Asia related to digital MSMEs, collaborative innovation, and regional ecosystem development. The global publication trend in this topic is moving towards an increase in the number of studies after 2020. This pattern is in line with the need for MSME business model transformation, technology integration, and the emergence of cross-sector collaboration in response to global economic dynamics. This confirms that the issue of a multi-stakeholder-based innovation ecosystem is increasingly becoming the main focus of the international academic community.research capacity. The country that stands out the most in scientific production is Brazil, which appears in the darkest blue, signaling the highest number of publications in the dataset.

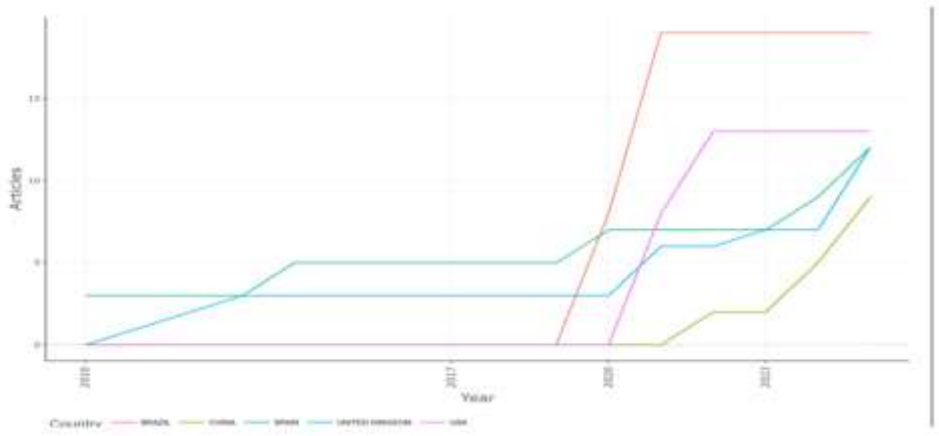

Figure 10. Countries production overtime

11. Most Cited Countries

The "Most Cited Countries" image provides an overview of the scientific impact of each country through the total citations received.The United Kingdom occupies the highest position with 244 citations. This shows the dominance of the UK in the literature on innovation and entrepreneurship ecosystems, especially research related to innovation systems, university-industry collaborations, and regional development. Belgium (167 citations) and France (166 citations) are next in the rankings. The two countries are known to be active in the development of theoretical and conceptual models of innovation ecosystems, including multi-stakeholder governance approaches and national innovation policies.Spain (122 citations) and Brazil (106 citations) have made significant contributions at the global level, signaling the development of the study of innovation ecosystems in the context of unique culture, public sector, and local economies.Countries such as Malaysia, Austria, Indonesia, Italy, and Slovenia have lower citations, but still show involvement in research in this field. The relative low citations can be due to the growing scale of research or the reach of publications that are not as large as those of Western European countries.

The citation distribution shows that Western Europe dominates the theoretical foundations and influential research in the theme of multi-stakeholder innovation ecosystems. However, the increasing contribution of Asian and Latin American countries in recent years indicates the beginning of a more global and diverse knowledge base.

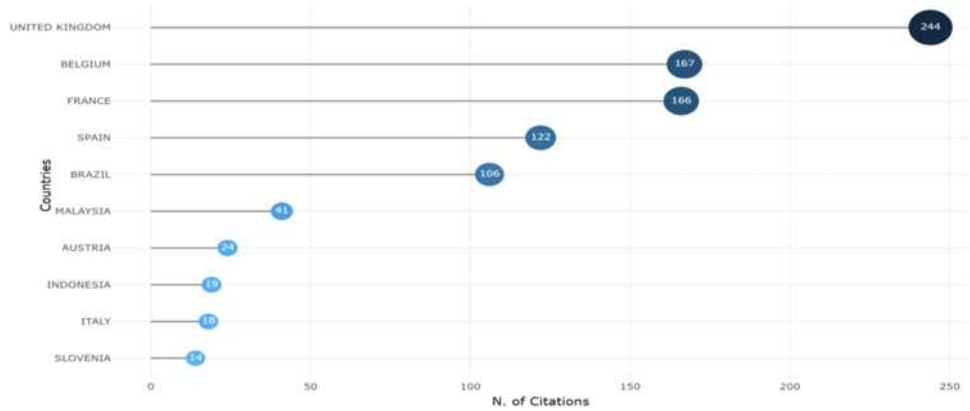

Figure 11. Most Cited Countries

12. Most Frequent Words Analysis

Keyword analysis provides an overview of the main focus of research in the theme of entrepreneurship, MSMEs, and multi-stakeholder based innovation ecosystems. Based on the results of Biblioshiny's mapping, there are several keywords that appear most often and become the center of discussion in the literature. "Entrepreneurship" (12 appearances) and "Innovation" (12 appearances) were the most dominant keywords. These two terms show that research in this domain focuses on the relationship between entrepreneurship and innovation as a

foundation in the development of multi-stakeholder ecosystems. The dominance of both reflects that value creation and innovative processes are at the core of the dynamics of MSMEs in a complex ecosystem."SMEs" (7 appearances) occupy the third position, confirming that MSMEs are the substantive focus of the literature, especially in the context of adaptive capacity, digitalization challenges, and cross-actor collaboration.The keywords "entrepreneur" (6 appearances) and "innovation ecosystem" (6 appearances) show that the research not onlydiscusses business units, but also the role of business actors as the main actors as well as the structure of the innovative environment in which they operate. Medium-frequency keywords such as “ecosystem, entrepreneurial ecosystems, open innovation, small and medium-sized enterprise, stakeholder”

Shows that the literature has begun to lead to a systemic approach—seeing MSMEs not only as economic entities but also as part of a collaborative network that includes governments, academia, industry, communities, and innovation support organizations.The dominance of keywords related to entrepreneurship, innovation, and SMEs shows that global research places great emphasis on the innovative transformation of MSMEs in the modern ecosystem landscape. The presence of keywords such as innovation ecosystem, open innovation, and stakeholders confirms that collaborative and multi-stakeholder perspectives are becoming increasingly important.

This is in line with a new paradigm in the study of entrepreneurship that views innovation as the result of dynamic interactions between various actors in the ecosystem, rather than just the company's internal capabilities. In addition, the frequency of MSME keywords underscores the importance of this business group as a driving force for local and global-based innovation. Thus, this keyword analysis reinforces previous findings that research on multi stakeholder innovation ecosystems has shifted towards a more holistic approach, emphasizing interdependence, collaboration, and innovation system dynamics in driving the development of MSMEs and entrepreneurship.

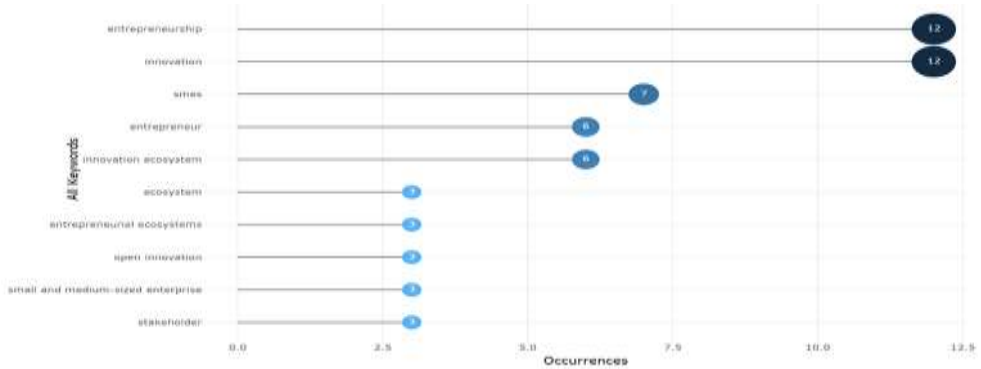

Figure 12. Most Frequent word

CONCLUSION

This study provides a comprehensive bibliometric analysis of research on entrepreneurship and SMEs within multi-stakeholder innovation ecosystems, offering valuable insights into the evolution, structure, and dynamics of scholarly contributions in this field. The findings demonstrate that research interest has grown significantly over the past decade, with a marked acceleration after 2020. This growth aligns with increasing global attention to collaborative innovation, SME resilience, sustainability transitions, and the role of digital technologies in transforming entrepreneurial ecosystems.

The knowledge mapping results indicate that the intellectual foundation of this research area is built upon established theories of innovation systems, open innovation, and entrepreneurial ecosystems. These theoretical frameworks are increasingly being expanded toward contemporary themes such as digital transformation, green innovation, stakeholder engagement, and cross-sector collaboration. The emergence of these themes reflects the complex and interconnected nature of innovation processes in which SMEs operate, requiring strategic partnerships with government, academia, industry, and community actors.

The study also highlights the global and multidisciplinary nature of this research domain. Countries such as Brazil, Spain, the United Kingdom, Portugal, and Australia appear as leading contributors, while emerging economies including Indonesia are increasingly active in producing scientific publications in this area. Furthermore, the growing level of international co-authorship underscores the importance of cross border knowledge exchange in advancing research on innovation ecosystems.

Overall, the study contributes to the academic discourse by offering empirical evidence on the structure and trajectory of global research related to SMEs and multi stakeholder innovation ecosystems. The findings suggest several future research directions, including deepening investigations into digital and green entrepreneurship, exploring ecosystem governance models, and examining the role of cultural and regional contexts in shaping innovation dynamics. Strengthening interdisciplinary and international collaboration will be crucial to advancing a holistic understanding and developing more effective strategies for enhancing SME performance and sustainability within innovation ecosystems.

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