

Sustainable Entrepreneurship and Innovation: A Bibliometric Analysis

Ahmed Adel Tantawy

Lecturer in International Business
Sheffield Business School, Sheffield Hallam University
City Campus, Howard St, Sheffield S1 1WB, UK
A.Tantawy@shu.ac.uk

+44 (0)7938519587

Ismail Boujnane

Lecturer in International Business
Sheffield Business School, Sheffield Hallam University
City Campus, Howard St, Sheffield S1 1WB, UK
I.Boujnane@shu.ac.uk

+44 (0) 7494427205

Ramjanul Ahsan

Lecturer in International Business
Sheffield Business School, Sheffield Hallam University
City Campus, Howard St, Sheffield S1 1WB, UK
Ramjanul.Ahsan@shu.ac.uk

+44 (0)7713934077

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Abstract

During the past few decades, considerable attention has been paid to the relationship between sustainable entrepreneurship (SE) and innovation. Despite a few systematic reviews on sustainable entrepreneurship, a review of the sustainable entrepreneurship-innovation link has not yet been conducted. This study seeks to address this gap by conducting a bibliometric analysis of articles published between 2008 and 2024 using the VoS Viewer software. This bibliometric analysis provides insights into SE and innovation by identifying research frontiers and interconnections rather than merely mapping the existing literature. Based on a sample of 159 peer-reviewed articles, we present an in-depth knowledge map of the field of SE and innovation based on data collected from the Web of Science database over the past 20 years. The results give a detailed picture of the SE impact on innovation. Finally, this paper discusses important research insights and provides future research directions.

Keywords: sustainable entrepreneurship, innovation, Bibliometric analysis, VoS Viewer

Track: Entrepreneurship

Word Count (5193)

1 Introduction

Entrepreneurship has been considered a mechanism to create wealth (Schumpeter, 1934). Firms have prioritised using renewable energy and materials, minimising waste, increasing productivity with a focus on quality and financial return, and overall sustainability (Punj et al., 2023). This reflects a mission shift of entrepreneurship to incorporate the social and environmental aspects alongside core business activities. This connection between economic, social and environmental activities establishes a new entrepreneurial dimension named sustainable entrepreneurship (SE) (Cohen and Winn, 2007; Muñoz et al., 2018). SE refers to “the implementation of innovations that promote sustainability and are targeted towards the mass market, intending to benefit a significant portion of society” (Schaltegger and Wagner, 2011, p. 225). SE integrates economic, social, and environmental dimensions of value creation. The primary objective of SE is to balance economic gains with preservation of nature, life support and community. It aims to create future products, processes and services while considering the broader gains for individuals, the economy and society, both in economic and non-economic terms (Shepherd and Patzelt, 2011). Consequently, sustainable entrepreneurship emerges as a distinct research area rather than merely an extension of social or environmental entrepreneurship.

The growing awareness acknowledges the significant potential for innovation and business opportunities in addressing sustainability’s economic, environmental, and social challenges. This represents the importance of implementing innovative solutions (Schaltegger et al., 2016; Schaltegger and Wagner, 2011). Innovation and SE are intricately interconnected concepts. The scope of sustainable innovation encompasses both product and process innovations, as highlighted by Dahlstrand and Stevenson (2010). These innovations aim to enhance the sustainability of production processes (Wesseling et al., 2015). Although Sustainable entrepreneurship is a relatively new field, with ongoing debates over its definition, drivers and boundaries (Avelar et al., 2024), there has been a growing interest in SE has led scholars to study the growing corpora of academic literature to highlight the growth, trends and challenges in SE (Anand et al., 2021; Bonfanti et al., 2024; Muñoz et al., 2018; Terán-Yépez et al., 2020). However, there has been no comprehensive and systematic review of sustainable entrepreneurship and innovation studies and what this means for further research.

Considering that innovation is a fundamental aspect of SE, serving as the catalyst for the development and creation of solutions that address environmental, social, and economic challenges (Boons and Lüdeke-Freund, 2013) and the key to achieving a more sustainable entrepreneurial ecosystem is to effectively carry out sustainable practices via innovation (Prokop et al., 2019; Schaltegger and Wagner, 2011). Sustainable entrepreneurs have the power to influence both markets and societies through their innovative approaches. By prioritizing environmental and social objectives, they can introduce products or processes that excel in quality and impact, thereby diminishing environmental footprints and enhancing overall well-being (Schaltegger and Wagner, 2011).

Despite the abundance of literature on SE, a gap exists in comprehending how SE promotes innovation to enhance the firms' sustainability. This gap is particularly noticeable in the lack of explicit efforts to understand the trends, patterns and research gaps in this dynamic field. The theoretical and intellectual understanding of SE and innovation relies on an updated picture of the literature’s development and status. Therefore, a complete analysis of the authors, references, and journals significantly contributing to SE and innovation research is needed. We systematically investigated publication activity to identify pertinent outlets and influential articles to achieve this research objective. We further explored publication venues, SE and

innovation trajectories, and highly cited references to map this field's establishment (i.e., where, what, and by whom). Two research questions hence apply:

RQ1: What are the patterns of publications and trajectories in the SE and innovation literature (to evaluate all publications and the number of publications and citations by the journal)?

RQ2: Which articles have been most influential in building a theoretical and empirical foundation in the SE and innovation literature?

After describing SE and innovation developmental trajectory and status, we shifted our focus to citation networks and author relationships. Co-citation analysis can reveal the intellectual structure of scholarly research. The frequency with which authors are cited in a sample paper conveys their relatedness (Anand et al., 2021; Donthu et al., 2021). This analysis can help researchers grasp authors' interrelationships, the connections among co-cited sources, landmark articles whose citations show a high growth rate, and a network of co-cited journals where secondary documents are published (Kim et al., 2024). In summary, we set out to demonstrate the inter-relational knowledge structure of SE and innovation research as follows:

RQ3: What are the statuses of the citation network and author relationships in articles on SE and innovation (to assess similarities in journals and authors)?

This study contributes to the existing literature on SE and innovation. First, this study provides a clear understanding of the distinct positions within this research domain and the conditioning factors of this relationship resulting from bibliometric analysis. Second, we conduct a performance analysis of the publication trends to identify leading authors, journals, and institutions. Using citation and co-authorship analysis, we identify the most prominent articles and authors, emphasising the need for collaboration among authors. Third, we group the existing literature on SE-innovation links into prominent clusters and research themes using co-citation and co-occurrence analyses so that future scholars can focus their research efforts accordingly. Furthermore, this study provides additional information for managers and policymakers to understand the role of innovation as a critical aspect of SE and how to achieve effective, sustainable entrepreneurial ecosystems.

The remainder of this paper is organised as follows. First, we describe and justify the research methods applied in this study. We adopted two different bibliometric techniques, including performance analysis and science mapping. We then present our findings. Before concluding, we discuss the main trends and patterns derived from our analysis and present a future research agenda.

2 Methodology

2.1 Bibliometric Analysis

Bibliometric analysis has received a great interest in business research (Anand, Argade et al., 2021; Bartolacci et al., 2020; Donthu et al., 2021). It is a statistical tool for providing a quantitative overview and summarising the main characteristics of literature used to draw researchers' attention to research trends and predict future results (Sharma et al., 2022). A bibliometric method is a method for analysing vast amounts of literature quantitatively, and it is a reliable and more accessible tool for summarising a large number of publications (Zupic and Čater, 2015). In addition to being able to analyse large volumes of data effectively over a specific timeframe, bibliometric analysis facilitates a complete and subjective evaluation of the

literature, providing a solid theoretical foundation for the existing literature (Huang et al., 2020). While systematic literature reviews rely on qualitative approaches, bibliometric analysis uses quantitative methods. These quantitative techniques include performance analysis and science mapping techniques to examine bibliographic data such as publication and citation counts.

Performance analysis is a descriptive analysis of the contributions made by the research constituents (e.g., authors, institutions, journals and countries) to a particular discipline, a similar method to the presentation of participants' backgrounds or profiles in empirical research with more analysis (Donthu et al., 2021). In addition, science mapping techniques incorporate various elements such as citation analysis, co-citation analysis, co-authorship analysis, co-word analysis and bibliographic coupling, as a combination of these techniques can provide insight into the bibliometric and intellectual structures of a field of research (Baker et al., 2020). Moreover, bibliometric analysis assesses the strength and direction of specific relationships (e.g., sustainability and innovation) between variables (Donthu et al., 2021). It also makes using a large volume of data accessible, which can generate excellent research impact. Hence, bibliometric analysis is suited for the present study as it helps to identify current and emerging research trends and performance (Anand et al., 2021; Donthu et al., 2021).

To analyse these articles, we used VoS Viewer and Bibliometrix. Recently, there has been a surge in the use of VoS Viewer (Anand et al., 2021; Campobasso and Boscia, 2023) because of its ability to analyse sizeable databases practically. Bibliometrix is a program based on R statistical software, which is open source and used by data scientists for data analysis and visualization. However, we integrated Bibliometrix with VoS Viewer to analyse the data. In addition, the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) method have been conducted in this study to enhance the trustworthiness of our analysis, and it has been widely accepted as a leading bibliometric analysis technique in recent years (Rao and Shukla, 2023).

2.2 Bibliometric Database Selection

We conducted a comprehensive search using the Thompson Reuters Web of Science (WoS) Core Collection database, widely recognised for its reliability in bibliometric studies due to its impartial search across publishers (Bartolacci et al., 2020; Falagas et al., 2008; Kim et al., 2024). Moreover, to maintain a balance between high quality and a manageable quantity of results in our study on sustainability, we chose the WoS database as it was deemed the most suitable based on prior literature searchers (Bartolacci et al., 2020; Moya-Clemente et al., 2021). We searched for the terms “sustainable entrepreneur*” and “innovation” in the titles and keywords. We used an asterisk for our search to ensure we did not leave out any articles of interest (Anand et al., 2021). The articles were published between 2008 to 2024 (February). We chose 2008 as the starting year because it seems to be the first year SE appeared in publications. February 2024 was the latest date for which complete bibliometric records were available from WoS.

2.3 PRISMA Flowchart

Figure 1 presents the PRISMA flowchart involving the bibliometric analysis papers. Based on the database- Web of Science, the number of articles found was 412 documents. 33 articles were removed as duplicate records. Thus, after removing these documents, 379 articles were discovered. We narrowed the number of articles to 303 upon considering several WoS categories (Business, Business Finance, Economics, Hospitality Leisure Sport Tourism,

Management, and Operations Research Management Science) as recommended elsewhere (e.g., Bartolacci et al., 2020; Donthu et al., 2021). When we only included English-language articles and excluded publications such as conference proceedings, book chapters, editorials, book reviews, review articles and data reports, our sample was reduced to 144. We then thoroughly examined the selected articles to ensure their topical relevance to SE. One author manually scrutinized all bibliometric records. Ultimately, 159 sources were retained for analysis.

Insert Figure 1 about here.

3 Results

3.1 Number of publications per year

Figure 2 presents the number of articles published annually on SE and innovation according to our research criteria from 2008 to 2024. In the early stage of 2017, there were only 24 papers published. However, the frequency of published journal articles has presented a progressive and steady rise from 2018 onwards. 2022 represents the highest publication, with 37 articles, followed by 34 in 2023. The trend in 2024 is similar, given that the data was collected in February, and there are already 8 articles published. The annual growth rate of SE innovation research from 2008 to 2024 is 35.59%, which indicates that the topic of SE innovation is increasing in popularity. This implies that the topic of the SE-innovation link is still valid and a driving theme for existing and future studies.

Insert Figure 2 here.

3.2 Most Relevant Journals

Citation analysis is a method of assessing the prominence of a publication by counting the number of times it is referenced in other publications (Feng et al., 2017; Xu et al., 2018). The results of this examination validate its status as an adjunct to the bibliographic coupling (Fahimnia et al., 2015). This study identifies 159 articles published in 79 peer-reviewed journals. Figure 3 shows the total number of articles published in the top 10 most relevant journals. A first look at this sample reveals that the *Journal of Business Strategy and the Environment*, a leading sustainable business journal, emerges from the others and accounts for 26 publications, representing a milestone in the recent literature. This journal was followed by *International Entrepreneurship and Management Journal* (10 articles); *International Entrepreneurship and Management Journal* (8 articles); *Small Business Economics Journal* (7 articles); *International Journal of Entrepreneurial Behaviour* and *Journal of Business Research* (6 articles each); *Journal of Business Ethics* and *Journal of Organization and Environment* (5 articles each); and *Journal of Business Venturing*, *Journal of Small Business Management* and *Technological Forecasting and Social Change* (4 articles each).

Insert Figure 3 here.

3.3 Leading Authors

The primary features of the 10 authors who contributed the most to the field of study on SE and innovation are displayed in Figure 4. Because this topic is still in the early stages of development, only two authors have more than four published papers. Schaltegger and Fichter are considered the most active authors in SE research (Teràn-Yépez et al., 2020), with 5 papers published during the stipulated time. Halberstadt, Hansen, Hockerts and Van Rijnsoever followed with 3 papers each. Finally, Aliabadi, Andersen, Ataei, and Beckmann each have 2 papers.

Insert Figure 4 here.

3.4 Co-Word Analysis

Authors typically use keywords to describe the research content generally. Co-word analysis studies the co-occurrence of specific keywords (Callon et al., 1991). This technique assesses the extent of co-occurrence between keywords and ideas inside the study area (Khanra et al., 2020). Figure 5 displays a co-word cloud composed of 50 words that were utilised to create it. The keywords are derived from the names of referenced sources to capture the theoretical substance of the articles (Deka and Sarmah, 2020). The analysis of the keywords detected in the documents makes the word “innovation” prominently emerge from the others as it shows the largest frequency of 16, followed by performance and sustainable entrepreneurship with (6) each, management (4), business (3) and so on. These provide valuable information about the concepts and key themes commonly discussed in the specialised fields of innovation and sustainable entrepreneurship.

Insert Figure 5 here.

3.5 Co-Occurrence Analysis

We applied the VOS viewer to output keywords to a co-occurrence network of the collection with time information (see Figure 6). The analysis of keywords is essential to describe the content and themes of the analysed documents (Rao and Shukla, 2023). This analysis determines the degree of co-occurrence of keywords and research domain concepts (Khanra et al., 2020). The authors’ keywords were used to retain the authors’ meaning. The distance between two keywords in the co-occurrence network reflects their link strength and relatedness, such that the shorter the distance between the two, the stronger the relatedness (Su and Lee, 2010). Figure 6 displays the main keywords, considering a threshold of five occurrences. The words that stand out the most are innovation, performance, sustainable entrepreneurship, management, business, entrepreneurship, green, impact, opportunity and technology. Moreover, the colour of each node (keyword) in the co-occurrence network reveals the average publication year and the mean of the publication years of all the documents with keywords in their titles or abstracts. Keywords that appear more towards 2008 are dark blue, and those that appear more towards 2024 are yellow. Furthermore, the average publication year of SE and innovation in the collection is 2018, which reveals that SE and innovation are emerging research topics with a growing demand that needs further exploration.

Insert Figure 6 here.

3.6 Country Analysis

With the data collected from WOS, we created a country collaboration map, as shown in Figure 7, according to the number of publications that allows, after the bibliometric analysis of the studies derived from the literature review, to identify the countries that are conducting collaborative studies related to the main topic of this paper. As depicted in the map, five different countries' collaboration can be observed. The first is led by the United States, presenting a strong collaborative link with India, Italy, the United Kingdom and Korea. The second one is led by the United Kingdom, which accounts for an equal collaboration with different regions of the world, such as Europe, Africa and Asia. The third group is led by China, which collaborates closely with countries such as India, Saudi Arabia, United Kingdom, Pakistan and Lebanon. Germany leads the fourth group, and the central collaborative countries are Austria and Denmark. Finally, the fifth group consists of India as a leader, and its main collaborative countries are Lebanon and Saudi Arabia. In conclusion, this observation underscores the significance of international cooperation in advancing knowledge and addressing key challenges within the thematic scope of our paper.

Insert Figure 7 here.

3.7 Thematic map of keywords

Although the keyword co-occurrence network is prominent in identifying relevancy and relationships, it requires additional evidence to capture emerging trends and future research tendencies. The thematic map provides an unbiased method of classifying keywords into clusters according to the strength of their internal (density) and external associations (centrality) (Donthu et al., 2021). In this sense, the upper-right quadrant (motor themes) represents well-developed mainstream topics that can influence the research field (Skute et al., 2019). The lower-right quadrant (Basic themes) shows transversal topics for a discipline, being able to influence other topics but weakly internally established (Skute et al., 2019). The lower-left quadrant (emerging or disappearing themes) highlights weakly developed or emerging topics that need further development (Donthu et al., 2021). Finally, the upper-left quadrant (niche topics) includes specialised topics among scholars (Skute et al., 2019).

The thematic map for SE and innovation research is presented in Figure 8 and highlights how the field (2008-2024) is grouped in terms of research topics. As motor topics, we identified concepts such as "growth," "economic growth," "energy," "corporate social responsibility," "opportunities," and "entrepreneurial", which are pertinent and thoroughly elaborated upon for organising this study subject. Themes in the upper-left quadrant, such as "hybrid," "institutional logics," "value creation," "ecosystem," "values," and "culture," have strong internal connections but weak exterior connections. Themes in the lower-left quadrant are underdeveloped and peripheral, mostly indicating developing or disappearing concepts. In this instance, "adaptation" and "sustainable development goals" seem to be gaining prominence because of their essential role. Themes in the lower-right quadrant are crucial for this study area but need elaboration. In this quadrant, transversal and general basic themes, including "sustainable entrepreneurship", "innovation", and "performance" appear in this section. They

are of marginal importance for the field but have not developed well. The thematic analysis shows that for better results, we can merge our research focus, which is “innovation” and “sustainable entrepreneurship” with “performance”.

Insert Figure 8 here.

To capture up-to-date results, we provide a thematic map for papers published between 2019 and 2024 (Figure 9). We identified significant topic changes: behaviour and competitiveness. On the one hand, the development of behaviour has increased, thereby being classified as an influential and well-developed topic. On the other hand, competition moved from a specialised topic to a transversal topic in the field. Therefore, we identified behaviour, culture, sustainable entrepreneurship, and innovation as Motor topics. As Basic topics, we identified competitiveness, business model, and challenges. As Niche topics, we identified age, entrepreneurial environments, triple bottom line and ecology. As up-to-date Emerging topics, we identified the policies, transformational leadership, sustainable development and dynamic capabilities.

Insert Figure 9 here.

4 Discussion

The present study examined the practical and conceptual links between innovation and sustainable entrepreneurship. Innovation profoundly impacts sustainable entrepreneurship by influencing the success of products or services in the market and the underlying production and consumption patterns (Lüdeke-Freund, 2020). Research conducted on the impact of sustainable entrepreneurship on innovation increased the attention of scholars through a bibliometric analysis, helping academic and practical benefits for policy formulation. This bibliometric study used statistical methodologies to analyse significant scientific output to identify trends, references, and co-references related to sustainable entrepreneurship and innovation. Based on the Web of Science database (WoS), we research trends in sustainable entrepreneurship and innovation from 2008 to 2024. The results show that the total number of 159 journal articles published by various authors working effectively in this field, particularly from 2018, showed the largest number of journal articles published as the number of publications increased, and 2022 showed the largest number of journal articles published.

Based on the analysis, the researcher’s attention is moving towards the implication of sustainable entrepreneurship on innovation as the number of citations increases in 2022. The analysis was conducted based on many factors, including year, nation, publisher, author, and research challenge (Paul and Criado, 2020). The graphical bibliometric assessment was constructed using the Vos Viewer programme. The leading journals are “Business Strategy & the Environment”, which published the largest number of articles in the field of sustainability and innovation, followed by “International Entrepreneurship and Management Journal”. Schaltegger and Fichter are the most influential authors in sustainable entrepreneurship research, with the highest publications in this area during the stipulated time, followed by Halberstadt, Hansen, Hockerts, and Van Rijnsoever, all of whom are active authors working in this field.

The co-word analysis utilized VoS Viewer to generate both the co-word cloud and network visualization illustrating the occurrence of keywords. The analysis identified that the following keywords were co-occurring within the authors' keywords: Innovation, sustainable entrepreneurship, management, entrepreneurship, performance, business, opportunity, technology, determinants, perspective, green, framework and strategies. Further, for the co-occurrence analysis, the main keywords with the most frequent and highest occurrence are innovation, performance, sustainable entrepreneurship, management, business, entrepreneurship, green, impact, opportunity and technology. The country publications and collaboration map analyse data about journal articles, geographical locations and citations collected from WOS to identify the countries conducting collaborative studies related to this study's main topic of sustainable entrepreneurship and innovation.

The results showed that the United States and the United Kingdom are on the top list of several articles and collaborations with different regions. The thematic map for sustainable entrepreneurship and innovation research shows the frequency of these terms. Words such as "growth," "economic growth," "energy," "corporate social responsibility," "opportunities," and "entrepreneurial" are pertinent and thoroughly elaborated upon for organising this study subject. In addition, "hybrid," "institutional logic," "value creation," "ecosystem," "values," and "culture" have strong internal connections but weak exterior connections. The analysis showed that specific themes are underdeveloped and peripheral, indicating either developing or disappearing concepts, such as the "adaptation" concept that seems to be gaining prominence because of its critical role. Moreover, other themes are crucial for this study area as they are not developed well and need elaboration, including "sustainable entrepreneurship", "innovation", and "performance". The thematic analysis shows the importance of merging the "performance" concept with our main topic- sustainable entrepreneurship and innovation.

4.1 Theoretical Contributions

By examining bibliometric data and analysing themes within the study's sample, our study contributes to the intersection between sustainable entrepreneurship (SE) and innovation. The study examines the journals, authors, keyword articles, and countries involved in this integration. This sheds light on the evolutionary path and key pivotal themes within this field, paving the way for further investigations. This study contributes to the current literature on SE and innovation by better understanding the distinct positions within this research field and the underlying factors of this relationship based on bibliometric analysis. Therefore, we employed a performance analysis of the publication trends to identify leading authors, journals, and institutions. Citation and authorship analyses identify the leading articles and authors, and this would facilitate knowledge extraction. Our results demonstrate that most papers have more than two authors, emphasizing the importance of collaboration. Moreover, the publication and citation patterns indicate a rising interest in SE and innovation (e.g., Avelar et al., 2024; Bonfanti et al., 2024). To understand this trend, we grouped the existing literature on SE and innovation into major clusters and research themes using co-citation and co-occurrence analyses so that future scholars can focus their research efforts accordingly.

We contribute to the entrepreneurship literature by further understanding the knowledge yield and current accomplishments on the relationship between SE and innovation. Prior reviews and meta-analyses mainly explored the SE as a field of knowledge (e.g., Contreras and Dornberger, 2022). Thus, our bibliometric analysis complements prior research by further enhancing our understanding of the relationship between SE and innovation. Therefore, this study provides managers and policymakers with additional information about the role of innovation as a critical aspect of SE and how to achieve sustainable entrepreneurial ecosystems.

4.2 Practical Implications

This study also provides critical implications for practitioners to foster sustainable development by incorporating sustainable entrepreneurship with innovation. The integration between sustainable entrepreneurship and innovation may achieve various technological developments to sustain the economic and social needs of various countries that traditional entrepreneurship ignores. Thus, entrepreneurs and managers can learn how to enhance sustainability and growth by focusing on innovation in developed and developing countries. It would benefit managers and entrepreneurs to review the study analysis of the academic players (authors, countries, and institutions) frequently advancing this field. As a result, they can find relevant references that will enable them to gain a deeper understanding of the impact of SE on innovation. In addition, managers and entrepreneurs can observe from our research how different countries with different economic sectors implement SE activities to understand how successful companies effectively adopt SE strategies to enhance their innovative capabilities, which provides an entrepreneurial sustainable orientation in these organizations.

Managers might notice that it is essential to incorporate a sustainable approach into entrepreneurial behaviour to maximize the innovation outputs, as there is ongoing research on how innovation as a fundamental aspect of SE drives the creation and development of environmentally, socially, and economically beneficial solutions. This integration can provide sustainable development objectives at various levels of organizations, economies, and societies. In addition, managers may also observe how academics help companies by understanding different phenomena associated with SE and innovation by gaining insights into several existing research trends. Based on the proposition that organizations show a greater impact on environmental and economic benefits such as creating jobs and skill development and enhancing resource efficiency, this may prove that innovation activities are crucial for a company's transition to sustainability. Moreover, this research highlights the current and emerging trends in the SE and innovation field, which may orient them with future practice and develop a sustainable entrepreneurial ecosystem.

4.3 Limitations and Future Research Directions

The review process used in this study has several limitations, which provide avenues for future research. First, this study is based on a sample of 159 journal articles using only the Web of Science database to increase the reliability of our findings. However, data retrieval from only one database reduced the number of documents evaluated for the bibliometric analysis. Future research could examine more articles using various databases such as Scopus. Second, the study was focused on the analysis of published articles for the period between 2008 and 2024, which may ignore recently published documents. Third, the review process focused on journal articles in English. Future scholars could focus on other languages to extend the scope of this study.

Fourth, we used only VoS Viewer and Bibliometrix as the principal analysis tool. The application of these tools may have shaped the interpretation. Further research could use other tools and software to provide more robust findings. Fifth, this study used specific keywords to search the journal articles. This would limit the number of journal articles. Moreover, this might exclude the synonymous words from the search strings. Additional keywords could be used to expand the results of our study. Researchers can use the thematic research interests and the keywords that co-occurred in this study to investigate the sustainable entrepreneurship approach and its applications on innovation. This will facilitate the content analysis and co-citation analysis in this field of research. Finally, an in-depth literature review could have

provided more detailed information about the relationship between SE and innovation (e.g., Contreras and Dornberger, 2022). Although we have identified the themes and clusters of the research trends, a detailed review of these themes and clusters would improve our understanding of SE and innovation literature. Future research should acknowledge these limitations while utilizing bibliometric analysis.

5 Conclusion

The primary aim of this study was to conduct a comprehensive analysis of the scholarly literature about Innovation and Sustainable Entrepreneurship, as documented in the Web of Science databases, to ascertain and summarise the current status of research in this specific field of expertise. The study introduces a methodology that outlines various phases of sample identification, screening, and analysis, along with a PRISMA flowchart to streamline article identification for the study. It also examines the articles on the relationship between sustainable entrepreneurship and innovation through bibliometric, thematic and country-level analysis that covers the period from 2008 to 2024 using WoS. Our study involved quantitative methods and visualization techniques to examine bibliographic coupling, citation patterns, co-authorship trends, co-citations, and co-word analysis and analyse country-wide publications within sustainability and innovation. Based on the analysis, the *Journals of Business Strategy* and the *Environment and International Entrepreneurship and Management* are the most popular journals among the study's sample. Moreover, the authors with the most publications are Schaltegger and Fichter. However, it is necessary to mention that the co-authorship rate is very low. This reflects that it is still necessary to disclose more knowledge and generate the impact it serves for future research.

In addition, the most influential countries are the USA and the UK, which provide various initiatives through the publication of large numbers of journal articles, the enhancement of policies, and the implementation of programs about SE to enhance innovation in these countries. The study also suggests that increasing evidence-based studies across various fields such as economic growth, energy, corporate social responsibility, and opportunities is critical for gaining a deeper insight into how sustainable entrepreneurship impacts innovation. This understanding can further reinforce developing and creating solutions that address environmental, social, and economic challenges. The study's findings will be valuable for further literature reviews within sustainability and innovation to find trends, progress, and the systematic evaluation of sustainable entrepreneurship on innovation. It presents novel insights by identifying research gaps in regions where studies are conducted, identifying areas lacking research, and providing critical concepts for guiding future research endeavours. It was noted in this study that there is a lack of research conducted in developing countries, indicating the need for further investigation to support the achievement of Sustainable entrepreneurship. To summarise, this bibliometric analysis will serve as a valuable tool for both local and international organisations seeking to understand the influence of sustainable entrepreneurship on enhancing innovation.

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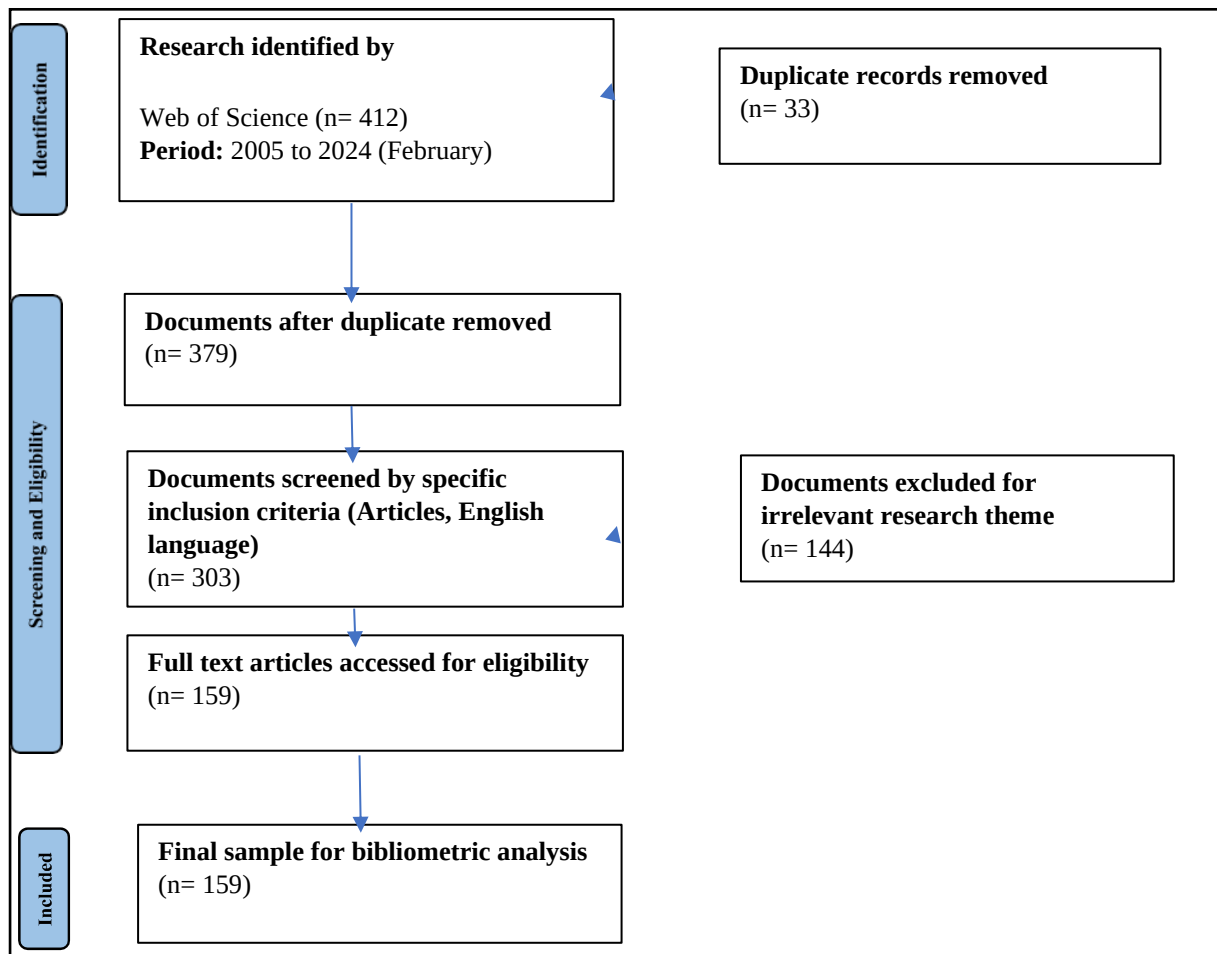


Figure 1: PRISMA Flowchart

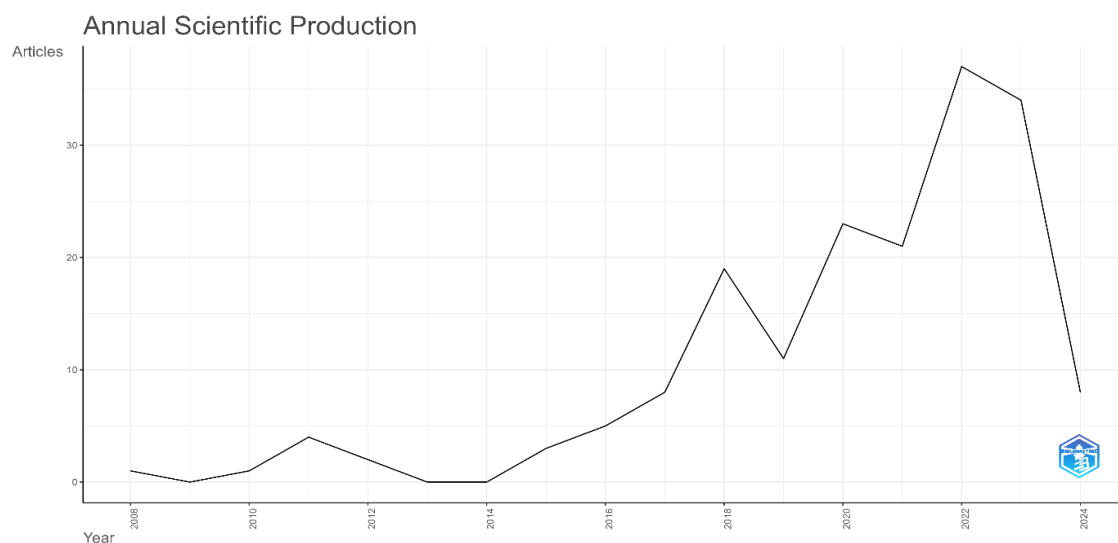


Figure 2: Annual Scientific Production (2008 – 2024)

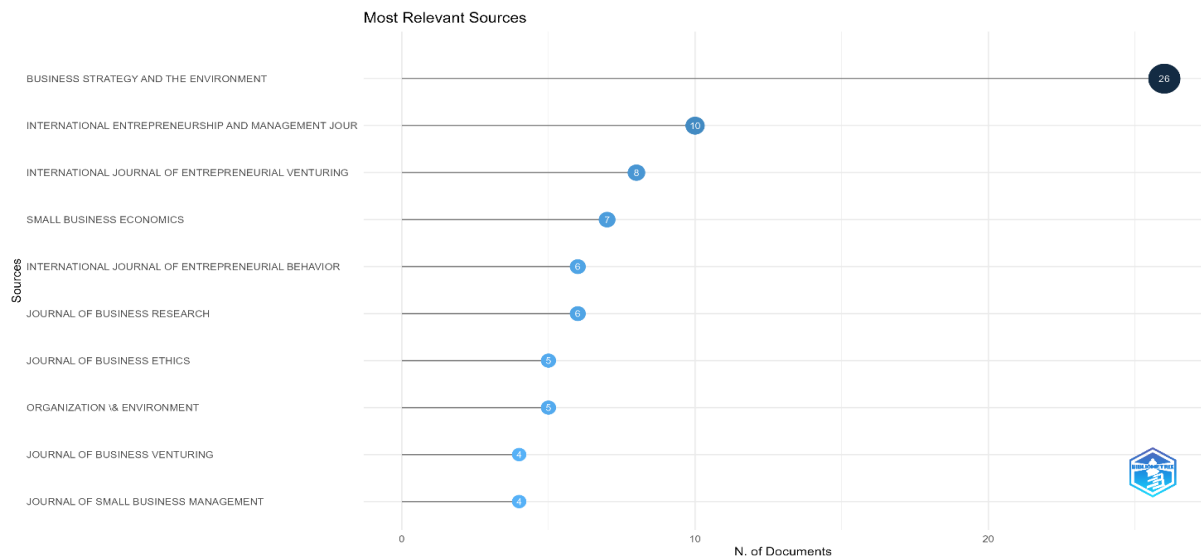


Figure 3: Most 10 Relevant Sources

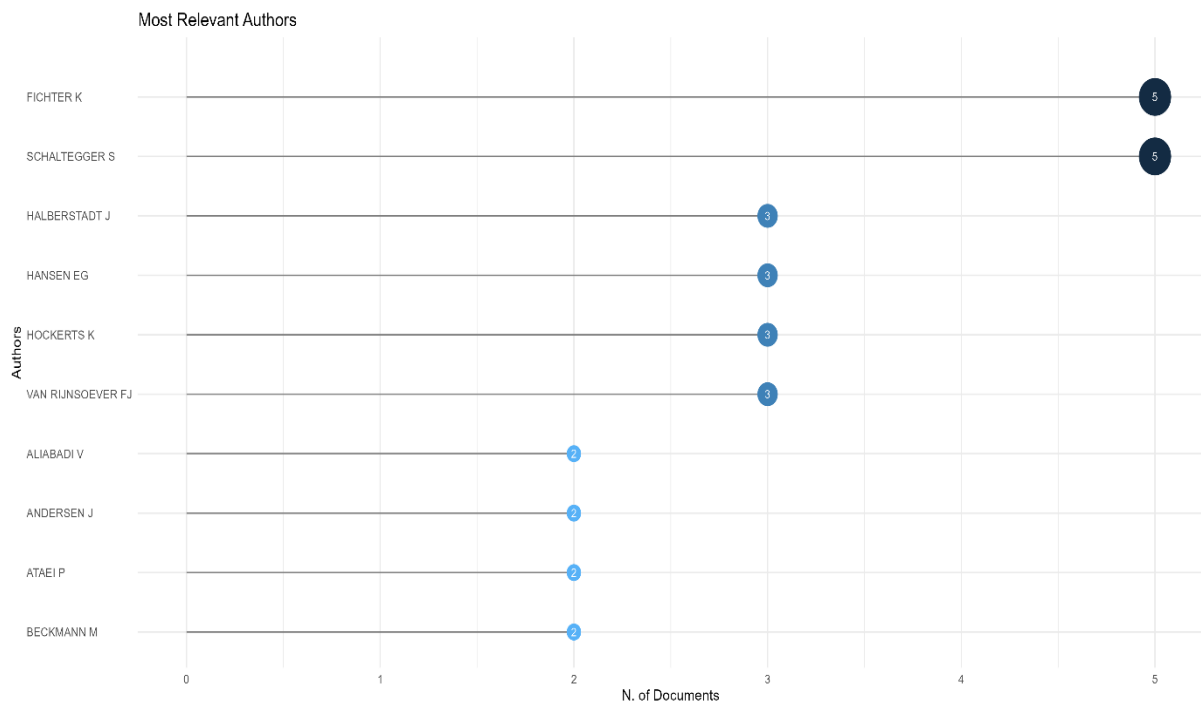


Figure 4: Most 10 relevant authors

Country Collaboration Map

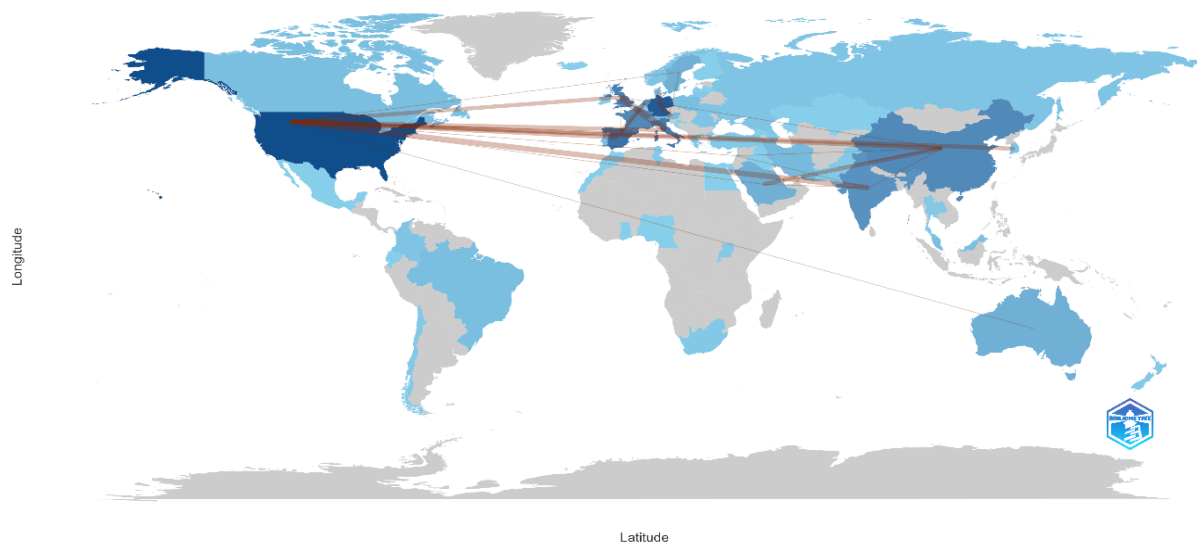


Figure 7: Country Collaboration

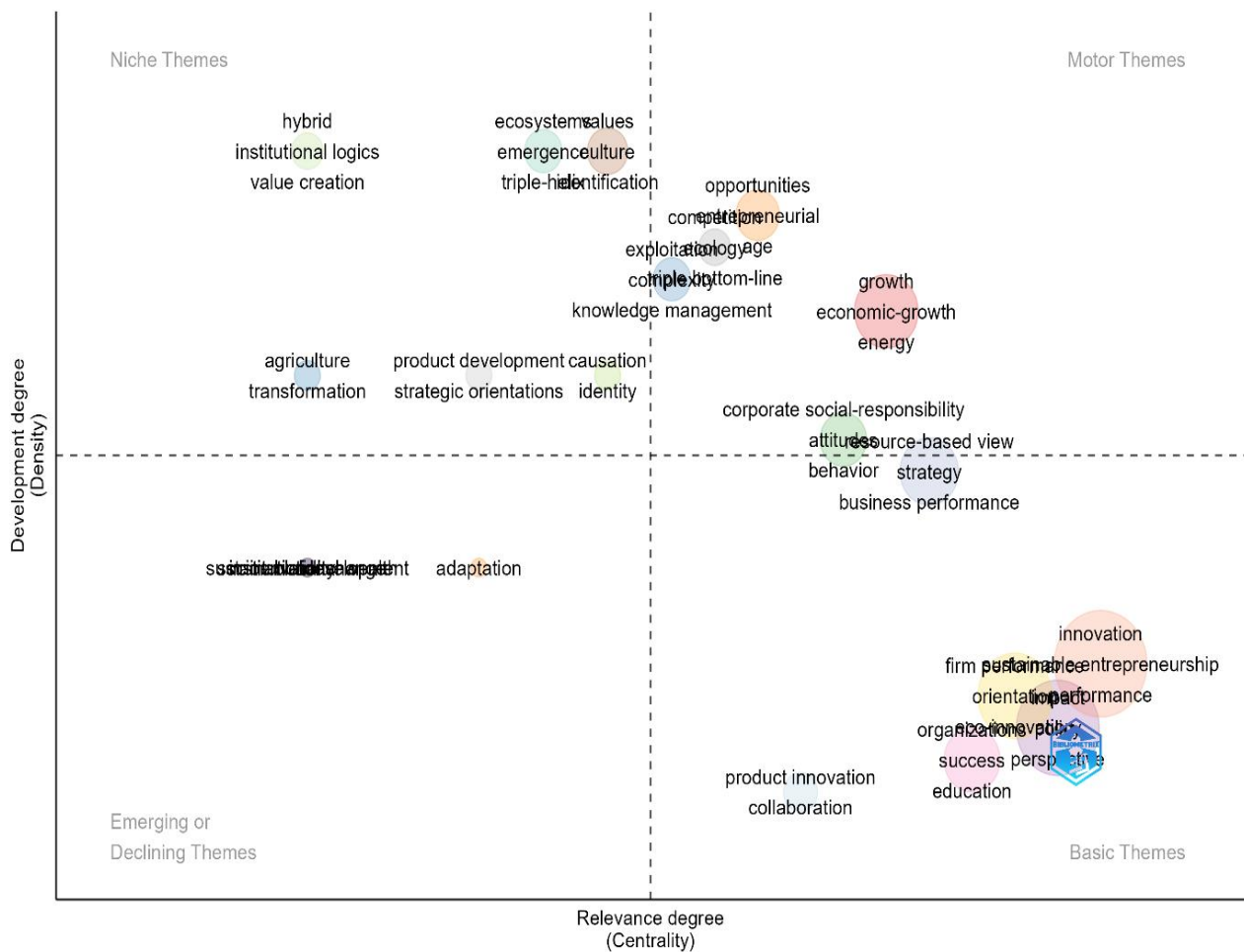


Figure 8: Thematic Map (2008-2024)

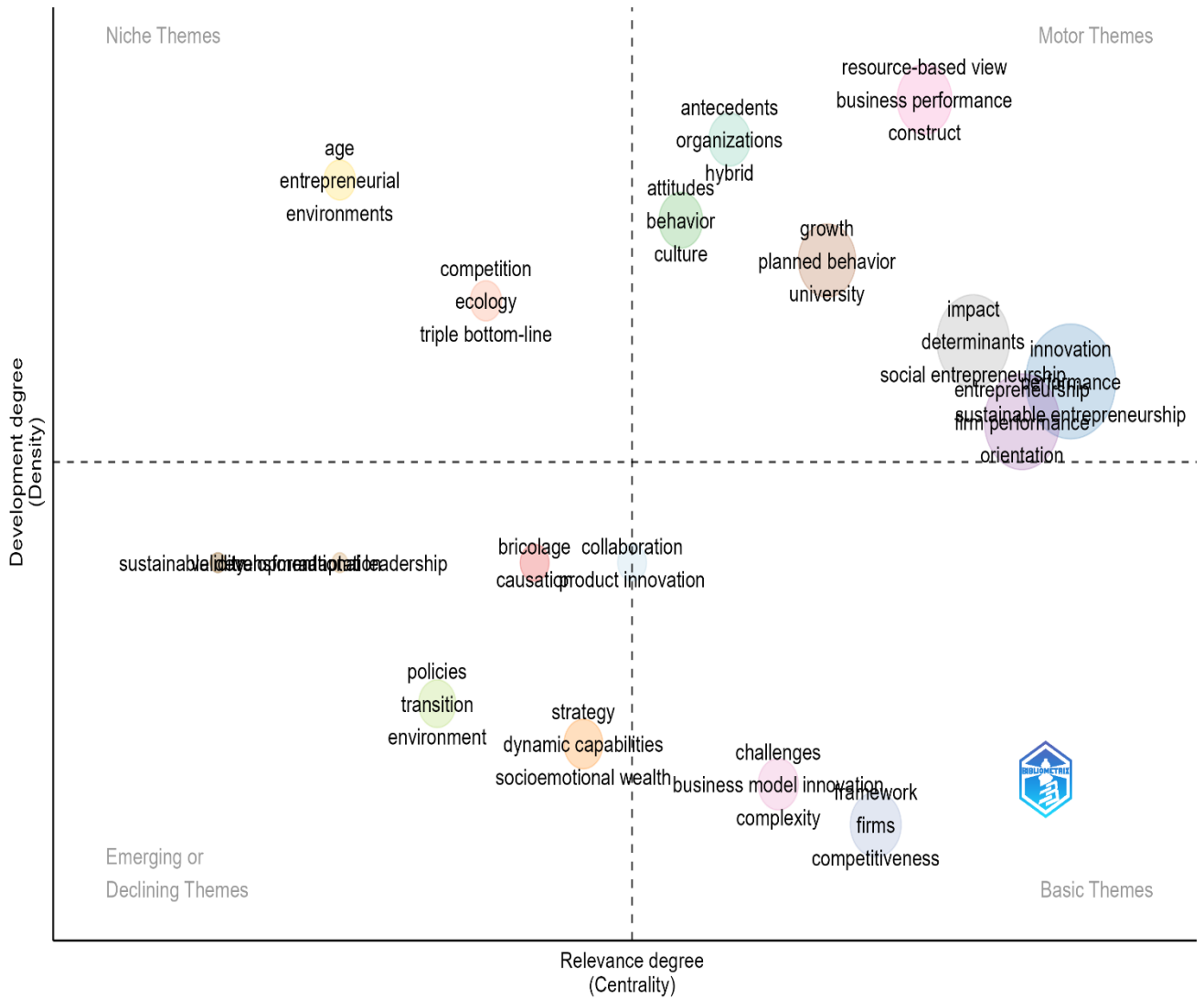


Figure 9: Thematic Map 2019-2024