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Bibliometric Exploration of Innovation and Entrepreneurship in the Context of Sustainable Development Goals

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Abstract

This bibliometric review explores the intersection of sustainability, innovation, and entrepreneurship within the framework of the Sustainable Development Goals (SDGs), offering an in-depth analysis of research trends, key contributors, and thematic evolution. Drawing on data from Scopus and Web of Science, the study examines English-language articles published in leading journals. It identifies prolific authors like Wang X and Wang Y, influential sources such as Sustainability, and countries like China, the USA, and the UK as central to shaping the discourse. The review reveals a significant growth in research output since 2015, reflecting the rising global emphasis on sustainability. Thematic analysis highlights an evolution from foundational concepts of sustainable development to advanced applications, including "digital transformation" and "green innovation." Collaborative networks and co-occurrence mapping underscore this field's interdisciplinary and global nature, strongly focusing on bridging innovation, entrepreneurship, and sustainability. However, the study also identifies limitations, such as regional imbalances and underexplored emerging themes, which present opportunities for future research. This review provides valuable insights for academics, practitioners, and policymakers seeking to advance sustainable innovation and entrepreneurial practices to address pressing global challenges.

Keywords: *Sustainability, Innovation, Entrepreneurship, Sustainable Development Goals (SDGs), Bibliometric Analysis, Green Innovation, Digital Transformation.*

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1. Introduction

During the 21st century, the creation of new ideas and their implementation into reality is the key point as they contribute towards firms achieving their goals and mission. For organizational growth and innovation, creativity in actions is needed (Audretsch et al, 2006).The studies of Antonites and Yuvren (2005) & Li and Yu (2018) defined creativity which means the generation of ideas and innovation as the implication of ideas into reality are important for economic growth. These elements are needed nowadays in education system, but very few vocational schools offer this type of education that promotes creativity among youth (Yusuf, 2007). Schumpeter (2000) defined entrepreneurship as innovation which means school education must focus on creativity and innovation, and take steps to avoid disharmony in creativity. Innovation helps to create new ideas, new solutions to problems, and new activities related to the environment, which helps to achieve sustainable development. With the help of innovation and entrepreneurship, cost can be reduced and sustainable growth can be achieved. Every culture must adopt creativity in their ideas when they start businesses. According to Jack and Anderson (1999), the demand for vocational education increased from the 1980s to 1990s and has the main focus on the advantages of entrepreneurship in economic growth. During the 1960s society wasn't aware about the cons of environmental destruction done for the development of beings. Due to environmental destruction, society faces various problems such as weather changes, floods, drought, poverty, etc. Green innovation is a form of innovation in entrepreneurship that helps to minimize greenhouse gases and also helps to increase productivity (Chen et al., 2006). According to Peattie and Ratnayaka (1992), the primary focus of the green movement 1980s was environmentally sustainable development and the UN's 2000 introduction of the Millennium Development Goals ignited a global debate over how to improve society sustainably (Jones & Lubinski, 2014). The seventeen SDGs are presented by the United Nations as human development initiatives. Storey et al. (2017) emphasized that SDGs are currently considered one of the main factors influencing the conversion of private enterprise. According to the studies of Adam (2004) & Galera and Borzaga (2009), In a few years, the idea of social initiative gained popularity. Social entrepreneurship defined as a gauge of civic engagement and awareness, has also gained traction. Pache and Chowdhury (2012) & Lee (2020) explained that if social enterprise is misaligned, the application of the SDGs will not prosper. The innovative contributions made by social entrepreneurs are vital in explaining the challenges associated with mortality. The fundamental idea of social enterprise does not arise spontaneously since it defines the logic of traditional capitalism. Tracey and Phillips (2007) & Pache and Chowdhury (2012) depicted that the knowledge to commence a social enterprise may be included in school courses on entrepreneurship. As a result, it is essential to incorporate the SDGs into the vocational educational system which promotes creativity. In addition to global cross-regional partnerships, the SDGs focus on five primary mechanisms: promoting people's well-being; fostering society's attitude towards future social development; addressing the ecology; and promoting similarity in institutions. The advancement in cleaner production technologies can help in achieving sustainable development (Batool et al., 2019). Agenda 2030 of sustainability development are unpredictable (Davidson, 2014; Van Tulder & Keen, 2018). Sustainability development aims to reduce inequalities, end poverty, and provide neat and clean energy and work environments to the people of nations (Dalampira & Nastis, 2020; Elalfy et al., 2020). The UNGA adopted 17 sustainable development goals as an intergovernmental agreement between nations at the global level that will guide nations for sustainable development (Jonas et al., 2018; Van Zanten & Van Tulder, 2018). According to Voegtlin and Scherer (2017), innovation is a necessity for sustainable development, and business units are a significant source of innovation. It is the social responsibility of businesses or organizations to support public issues and to act in such a way that will help to achieve sustainable development. Business organizations must consider the dimensions of sustainability and should act to achieve sustainable development through innovation (Candia et al., 2019). In this way, innovation and entrepreneurship play a significant role in achieving sustainable development.

The paper is organized as follows: it begins by outlining the research methodology, followed by presenting the key findings from the bibliometric analysis. Finally, it concludes with recommendations for future research.

2. Research Methodology

The primary objective of this research is to examine the role of innovation and entrepreneurship in driving sustainability within the framework of SDGs. The study addresses the following research questions (RQ) to explore deeper into the study. RQ 1: What is the annual scientific production of sustainability, innovation, and entrepreneurship? RQ 2: Which are the top authors, countries, sources, and articles contributing to sustainability, innovation, and entrepreneurship?

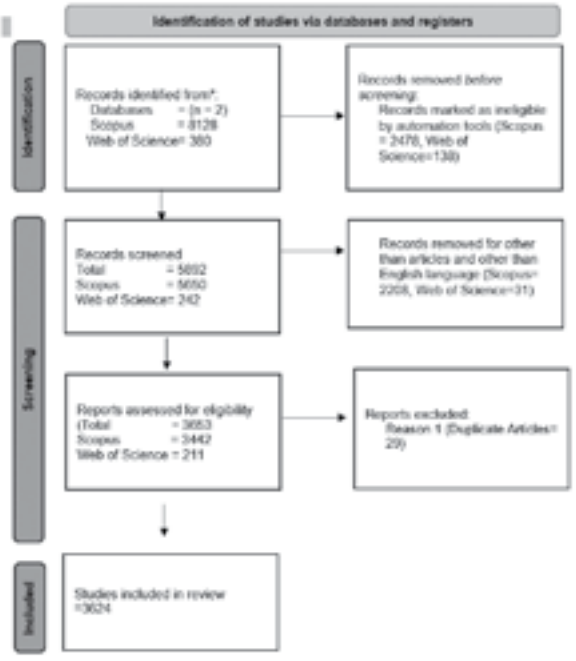

Figure 1

Flowchart showing the selection of data taken into consideration for the study

RQ 3: How is evolution examined using study topics such as sustainability, innovation, and entrepreneurship?

RQ 4: Which countries are involved in researching sustainability, innovation, and entrepreneurship? RQ 5 What are the most dominant keywords related to research on sustainability, innovation, and entrepreneurship?

RQ 6: What is the impact of journals in the field of sustainability, innovation, and entrepreneurship? RQ7: What are the trending topics in the field of research on sustainability, innovation, and entrepreneurship? To analyze the published topics, journals, authors, and other things bibliometric analysis approach is used in the study. The bibliometric approach is a method to analyse published data through the quantitative approach using different software (Pritchard, 1969). This approach provides an overview of different domains such as the most relevant author, relevant document, top cited document, keyword occurrence, top cited countries, etc. This approach is recently developed due to computers and good network connections. To get an overview of Sustainable development in innovation and entrepreneurship, this work mainly focuses on data from the Scopus and Web of Science (WOS). 3624 articles are taken into consideration for the study. The datasets from Scopus and Web of Science were combined using R Studio, a powerful tool for statistical computing and data analysis. During the merging process, duplicate entries were carefully removed to create a unified dataset that offered comprehensive coverage of the research area. Once merged, the dataset was exported and analyzed through Biblioshiny, a user-friendly interface of the Bibliometrix R package. This streamlined approach enabled detailed bibliometric analysis and visualization, preparing the data for the next stages of the study. The software Biblioshiny of R studio is used to conduct the study.

Data was collected on 3rd December 2024 through the Scopus and Web of Science databases. The search string used in the study has been limited by applying the query of title, abstract, and keywords: ("SUSTAINABLE DEVELOPMENT GOAL" OR "SDG'S" OR "UNITED NATION SUSTAINABLE DEVELOPMENT GOALS" AND "BUSINESS" OR "ENTREPRENEUR" OR "INNOVATION"). This paper followed a structure PRISMA (Preferred Reporting Items for Systematic Review and Meta-Analysis (Moher et al, 2015). A total of 3624 articles are included in the study after the PRISMA framework which includes four stages in:

i. Identification of studies from the database

ii. Screening of studies based on exclusion criteria

iii. All documents published from the First day to 2024 are included, subject fields are also used as inclusion-exclusion criteria, only studies related to environmental science, Green sustainable science technology, Environmental Studies, Business, management, and Economics were included in the research. Documents other than articles were excluded.

iv. The data from Scopus and Web of Science was combined using R Studio, and the merged dataset was subsequently extracted through Biblioshiny for further analysis.

The research process began with the extraction of articles from two major academic databases, Scopus and Web of Science. A total of 8,182 articles were retrieved from Scopus, while 380 articles were extracted from Web of Science. Following the initial extraction, an automation filter was applied to both datasets to refine the selection based on specific criteria such as subject area, and relevant keywords. Subsequently, the language filter was applied to filter out articles not published in the desired language so that only those studies that are understandable and relevant are included. The datasets of both databases were then merged using R Studio, thus forming a single dataset. After merging, the dataset was also cross-checked for duplicates, resulting in the elimination of 29 duplicate articles. The whole process came down to 3,624 unique articles that finally fit the required inclusion criteria. In its entirety, from selection through filtering and further refinement of the articles, all of the process was documented within the PRISMA framework to facilitate clarity and transparency in the methodology.

3. Discussion

a. Most Relevant Authors

Figure 2 focuses on the most prolific authors contributing to the research domain under consideration. It presents a horizontal bar graph ranking authors by the number of documents they have published. Among the top contributors, "Wang X" and "Wang Y" stand out with the highest number of documents, 20 each. Following them are authors such as "Li Y" and "Liu Y," each with 16 publications, and "Khan M," "Zhang X," and others with slightly fewer contributions. This visualization highlights the dominance of a few key authors and underscores their significant influence within the research domain.

b. Most Relevant Sources

Figure 3 highlights the most prominent journal and publication sources in the field. "Sustainability" is by far the leading source, boasting 593 documents, indicating its critical role in disseminating research on sustainability-related topics. Other significant journals include the "Journal of Cleaner Production" with 156 papers and "Sustainable Development" with 65 publications. Other journals like "Business Strategy and the Environment" and "Environment, Development and Sustainability" are also major contributors, emphasizing the diversity of sources available for scholarly work in this area. This chart showcases where scholars prefer to publish their work.

c. Annual Scientific Production

Figure 4 tracks the growth of annual scientific publications over time. Initially, the production remained negligible until around 2010. However, a sharp upward trend is observed starting from 2015, reflecting an explosion of research activity. This trend likely aligns with a global increase in awareness and prioritization of sustainability, climate change, and other modern challenges. Interestingly, the peak appears around 2023, after which there is a sharp decline in the represented dataset for 2024, which could be due to incomplete data collection for the current year.

d. Thematic Evolution (2000–2025)

The thematic evolution visualization (Figure 5) outlines how research themes have evolved in sustainability, innovation, and entrepreneurship over the decades. During 2000–2008, the primary focus was on "sustainable development," reflecting an early-stage understanding of sustainability as a core objective. As time progressed (2009–2016), the discourse expanded to the concepts like "word-of-mouth," "planning," and "flax," demonstrating

diversification in sustainability-related strategies and practices. This era shows a growing interest in integrating sustainable practices into planning and communication, revealing a shift towards wider adoption and community engagement. 2017–2025 marks even more rapidly changing landscape, with "sustainable development goals," following directly along the UN's agenda set out globally for all, joining "social media" and "models" as headliner topics. This is a sign of development when digitally enabled platforms and conceptual frameworks are used throughout for broad engagement in sustainability. These transitions show a transparent trajectory: from basic concepts to innovative applications that are more integrative and use digital tools in community networks, all aspects speaking to a holistic approach to entrepreneurship and innovation.

e. Three-Field Plot: Journals, Keywords, and Countries

The three-field plot (figure 6) connects sources (journals), keywords (research themes), and countries (authors' affiliations), showing the interdisciplinary and global nature of sustainability and entrepreneurship research. Key journals like Sustainability, Technological Forecasting and Social Change, and Sustainable Development dominate the discourse, forming foundational platforms for knowledge dissemination. Keywords such as "sustainable development goals," "sustainability," and "innovation" are central, bridging different disciplines. On the geographical front, China, India, the USA, and the UK are leading contributors, thereby indicating their influence in the research landscape. This interconnected Visualization further shows how specific Journals and keywords are central to global research output, illustrating the integration of innovation into sustainability practices. Cross-country collaboration provides these studies with greater practical applicability and underlines entrepreneurial models that are globally scalable but locally impactful.

f. Country Collaboration Map

The collaboration map depicted in Figure 7 presents research collaborations among partners across nations over sustainability, innovation, and entrepreneurial themes. Some of the partnerships are showing strong connection with more than two collaborating nations. Partnerships involving collaborations between groups of countries provide the needed opportunities for spreading inventions and innovations about sustainable endeavors. In light of this mapping, some main hubs are present in regions - North America, Europe, and Asia - from which most innovations within sustainability emerge. This interconnectedness indicates the importance of sharing expertise and resources to address global challenges. For instance, a combination of manufacturing innovation in China and the USA's technological strengths shows that disparate strengths complement each other to tackle sustainability goals. Moreover, newer collaborations with Africa and South America are pointing to an increasingly greater representation of divergent perspectives. These partnerships highlight entrepreneurship as a means to foster sustainable development, emphasizing the significance of global cooperation in innovation-driven solutions.

g. Co-occurrence Network Visualization

The co-occurrence network graph 8 highlights the interconnected themes in the domains of sustainability, innovation, and entrepreneurship. At its core, the concepts of "sustainable development" and "sustainable development goals" dominate, represented by their central placement and larger node size. This indicates their pivotal role as foundational topics in academic and applied discussions. Peripheral themes like "digital transformation," "circular economy," and "green finance" are interconnected, reflecting their relevance in achieving sustainability through innovation. Especially, the isolation of "purchase intention" and "online reviews" suggests niche sub-domains with less direct overlap with the core sustainability framework but are nevertheless relevant in entrepreneurship and consumer behaviour research. This network underscores the interdisciplinary nature of sustainability studies, linking economic growth, technological advancements, and socio-environmental priorities. Such a map serves as a valuable tool for identifying research gaps and exploring underexplored interconnections among the disciplines.

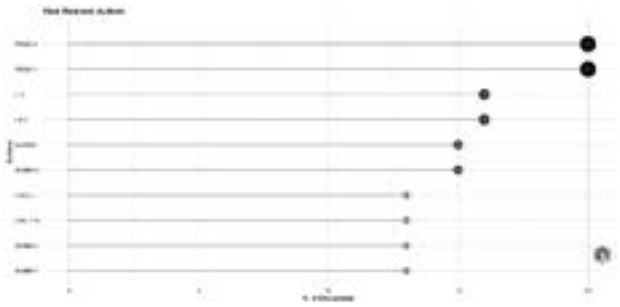

Figure 2

Relevant authors in Sustainability, innovation, and entrepreneurship.

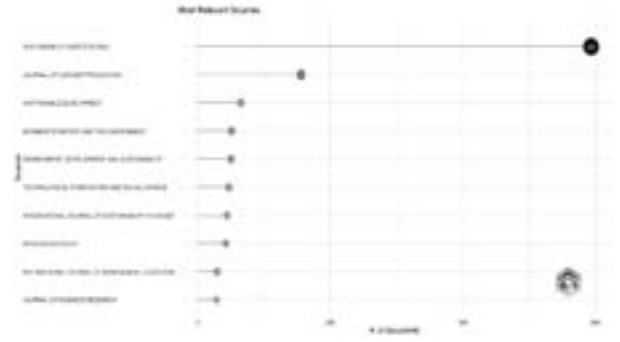

Figure 3

Relevant sources in Sustainability, innovation, and entrepreneurship.

h. Word Cloud Representation

The word cloud (figure 9) visualizes the frequency of terms in the sustainability, innovation, and entrepreneurship literature. Dominant terms like "sustainability," "sustainable development," and "SDGs" (Sustainable Development Goals) reflect their prevalence and criticality in the discourse. Terms like "innovation," "circular economy," "climate change," and "corporate social responsibility" also appear prominently, indicating their essential roles in addressing sustainability challenges. Additionally, emerging topics such as "digitalization," "green innovation," and "renewable energy" highlight the integration of technological and economic solutions into sustainable practices. The prominence of "COVID-19" emphasizes the pandemic's impact on reshaping sustainability agendas, especially in entrepreneurship and higher education. This visualization effectively encapsulates the breadth and depth of the field, offering a snapshot of evolving priorities and trends.

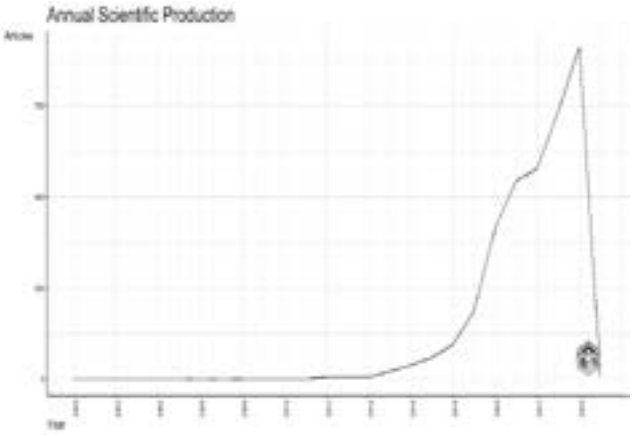

Figure 4

Annual scientific production in Sustainability, innovation, and entrepreneurship.

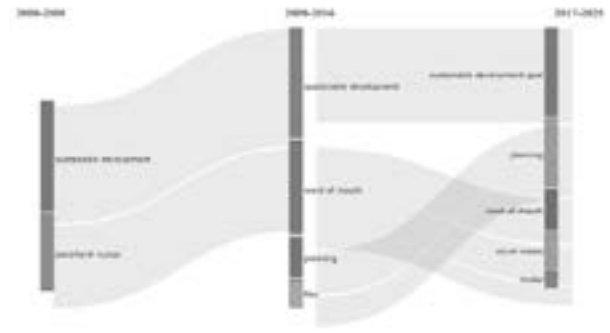

FIGURE 5

Thematic Evolution (2000–2025) of Sustainability, innovation, and entrepreneurship.

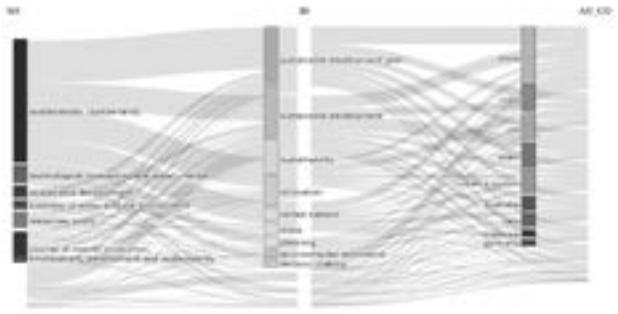

Figure 6

Three-field Plot: Journals, Keywords, and Countries of Sustainability, innovation, and entrepreneurship.

Figure 7

Collaboration map of Sustainability, innovation, and entrepreneurship.

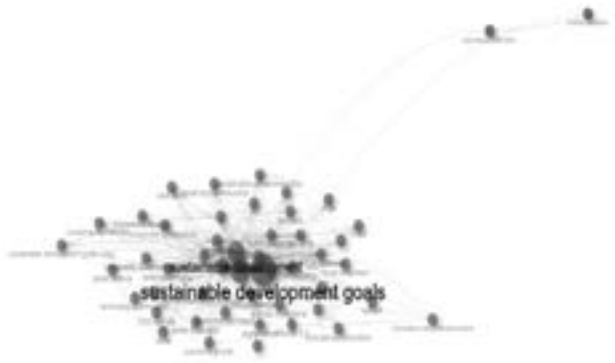

Figure 8

Co-occurrence network of Sustainability, innovation, and entrepreneurship.

Figure 9

Word cloud of Sustainability, innovation, and entrepreneurship.

i. Most Cited Countries

The bar graph showcasing the most cited countries (Figure 10) illustrates the global distribution of influential research in sustainability and innovation. China emerges as the leader, with over 10,000 citations, demonstrating its robust academic and practical contributions, particularly in green technology and policy implementation. The United Kingdom, USA, and Italy follow, reflecting their strong focus on sustainability through innovation and policy research. India's growing citation count highlights its increasing engagement in sustainable entrepreneurship, aligned with its developmental goals. Interestingly, the Netherlands and Korea are also included, showing their niche yet impactful contributions to sustainability-related studies. This visualization gives insight into regional strengths and academic collaboration opportunities, which shows the diversity of global efforts toward sustainable development.

J. Globally Cited Documents: Leaders in Sustainability Research

Table 1 shows the most globally cited documents in sustainability, innovation, and entrepreneurship. These works represent pivotal contributions to advancing knowledge in these areas. The document by Mudambi (2010) leads the list, published in MIS Quarterly, with 1,769 citations. This work's impact lies in its exploration of knowledge creation and value generation within sustainable business practices, making it a foundational resource for strategic management. Other influential papers include Park et al. (2007) in the International Journal of Electronic Commerce and Sachs (2019) in Nature Sustainability, with 1,143 and 1,128 citations, respectively. These papers explore technology's transformative role in fostering sustainable commerce and global sustainability frameworks. This includes Schot (2018) in Research Policy and Di Vaio (2020) in the Journal of Business Research, emphasising the integration of policy-making and entrepreneurship towards urgent global challenges, which this truly picturesque research landscape adds more to.

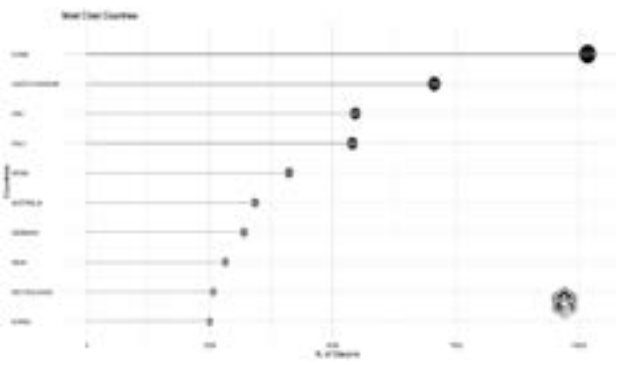

Figure 10

Most cited nations of Sustainability, innovation, and entrepreneurship.

k. Journal Impact: H-Index as a Measure of Influence

Table 2 specifically addresses journals by H-index, which lists the most impactful publication platforms for sustainability-related research. Sustainability (Switzerland) tops the list with an H-index of 51, refocusingitsroleasacentralrepositoryforhigh-quality research, diversely spread throughout problems of sustainability. It is followed by the Journal of Cleaner Production with an H-index of 45. That journal has a special interest in sustainable production techniques and the circular economy. Another group of popular journals comprises Technological Forecasting and Social Change, along with Sustainable Development, supporting strategic visioning in approaching the challenge of sustainability, coupled with a holistic system view. Business-focused journals such as the Journal of Business Research and Business Strategy and the Environment provide vital insights into how entrepreneurship can be a driving force for innovation while aligning with environmental and social goals. These journals collectively offer a wealth of knowledge for academics and practitioners alike, fostering the evolution of sustainable business practices and research.

l. Geographical Contributions: Global Research Dynamics

Figure 11 highlights the geographical distribution of corresponding authors, showcasing the regions that lead in research output and collaboration. China emerges as the top contributor, reflecting its growing focus on sustainability-driven innovation and leadership in global research. The majority of its publications are single-country studies, though it also actively participates in international collaborations. Spain, the United Kingdom, and India follow closely, emphasising their strong research ecosystems and focus on solving sustainability challenges through innovation and entrepreneurship. The United States and Italy exhibit a notable balance between domestic research and global partnerships, contributing significantly to the field. Emerging economies such as Malaysia, Brazil, and South Africa also play important roles, addressing region-specific sustainability challenges like biodiversity loss and equitable economic development. This global diversity underscores the universal relevance of sustainability research and highlights the need for collective action across borders.

4. Conclusion

The field of sustainability, innovation, and entrepreneurship is changing fast because of the global need to address urgent environmental, economic, and social challenges. This bibliometric review provides insights into the most important trends, themes, and contributions shaping this interdisciplinary domain and offers a comprehensive understanding of its current landscape. Some of the findings from this literature review include how sustainability is fast becoming the mainstream theme of discussions in academic community and the practical fields. The growth of publications and citations shows the global acceptance of sustainability in innovation and entrepreneurship. Journals such as Sustainability and the Journal of Cleaner Production have emerged as critical platforms for disseminating impactful research. The evolution of themes over time reveals the dynamic nature of this field. The thematic diversification is a sign of a shift from theoretical explorations to practical, innovative applications that address real-world challenges. Geographically, the study reveals that sustainability research is a global affair. Countries such as China, the USA, and the UK have become leaders in terms of both productivity and influence, contributing significantly to the global discourse. The three-field plot is also an element of the co-occurrence network, which emphasises the confluence of innovation, entrepreneurship, and technology within sustainability. Such key concepts

as "circular economy," "green finance," and "digital transformation" are the bridges that cross disciplines, allowing for interdisciplinary research and practice. Overall, the review points out the transformative power of sustainability, innovation, and entrepreneurship in the face of such pressing global challenges as we move forward, the insights of this review will serve as a roadmap for researchers, practitioners, and policymakers to continue efforts toward a more sustainable and inclusive future.

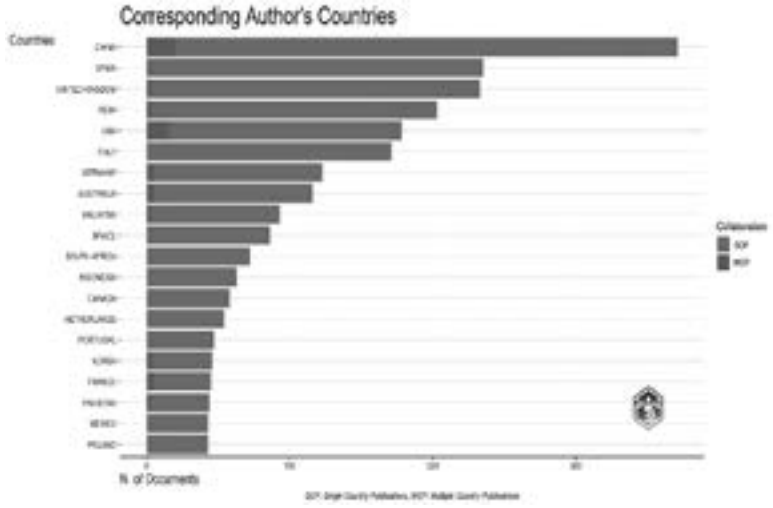

Figure 11

Chart of the most relevant countries of Sustainability, innovation, and entrepreneurship

Table 1:

Globally cited documents

Paper	DOI	Total Citations	TC per Year	Normalized TC
MUDAMBI SM, 2010, MIS QUART	NA	1769	117.93	1.98
PARK DH, 2007, INT J ELECTRON COMM	10.2753/JEC1086-4415110405	1143	63.50	1.00
SACHS JD, 2019, NATURE SUSTAIN	10.1038/s41893-019-0352-9	1128	188.00	23.01
SCHOT J, 2018, RES POLICY	10.1016/j.respol.2018.08.011	950	135.71	15.88
CHEUNG CMK, 2012, DECIS SUPPORT SYST	10.1016/j.dss.2012.06.008	815	62.69	5.43
BEBBINGTON J, 2018, ACCOUNT AUDIT ACCOUNT J	10.1108/AAAJ-05-2017-2929	590	84.29	9.86
DI VAIO A, 2020, J BUS RES	10.1016/j.jbusres.2020.08.019	511	102.20	13.00
AHMAD M, 2020, RESOUR POLICY	10.1016/j.resourpol.2020.101817	495	99.00	12.59
SCHEYVENS R, 2016, SUSTAINABLE DEV	10.1002/sd.1623	485	53.89	10.52
PARK DH, 2008, ELECTRON COMMER R A	10.1016/j.elerap.2007.12.001	454	26.71	1.04

TABLE 2:

Impact of Journals

Element	h_index	g_index	m_index	TC	NP	PY_start
SUSTAINABILITY (SWITZERLAND)	51	79	5.1	11225	593	2015
JOURNAL OF CLEANER PRODUCTION	45	83	2.813	7441	156	2009
TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	23	46	4.6	2193	47	2020
SUSTAINABLE DEVELOPMENT	22	43	2.444	1927	65	2016
BUSINESS STRATEGY AND THE ENVIRONMENT	19	44	2.375	1945	51	2017
JOURNAL OF BUSINESS RESEARCH	19	28	1.9	2038	28	2015
INTERNATIONAL JOURNAL OF MANAGEMENT EDUCATION	17	29	2.125	1178	29	2017
JOURNAL OF RETAILING AND CONSUMER SERVICES	16	22	1.778	964	22	2016
INTERNATIONAL JOURNAL OF SUSTAINABILITY IN HIGHER EDUCATION	14	27	2.333	803	44	2019
RESOURCES POLICY	14	33	2.8	1122	42	2020

5. Implications

This review provides critical insights into the nexus of sustainability, innovation, and entrepreneurship, which has vast policy implications for policymakers, academics, and practitioners alike. The findings rest mainly on the importance of incorporating sustainability in business models and innovation strategies for the SDGs. These findings can be utilized by policymakers in formulating relevant policies on topics like “circular economy” and “green finance” for the benefit of sustainable practice by industries. Results for practitioners-entrepreneurs, particularly present the opportunity to encircle digital transformation and renewable energy in their business venture, leading to scalable, impactful business models. The identified trends can be useful for academics to guide future research directions, promote interdisciplinary collaboration, and address emerging global challenges such as climate change and social equity. This study also provides valuable information for scholars looking to publish impactful work or build international research collaborations by highlighting the dominance of specific journals, authors, and countries.

6. Limitations And Scope For Future Research

This study has several limitations that must be acknowledged. Firstly, the study included only English-language articles. This linguistic constraint could have omitted vital knowledge which is published in articles other than English language. Additionally, the application of RStudio as the principal tool for the analysis was technically limiting. Since VOS viewer software, is not compatible with the merged dataset of Web of Science and Scopus in the Excel format, it could not be applied to the dataset. Therefore, the visualisation and network analysis that VOS viewer could have enriched were not utilised in this study. Last, the study relies heavily on quantitative patterns and trends and, therefore, opens up a possibility of qualitative insights that could have brought out more detailed research dynamics and contextual nuances. Future studies may address these limitations by including diversified data sources, multilingual content, and more analytical tools that can increase the robustness and comprehensiveness of the findings.

Future research in sustainability, innovation, and entrepreneurship should be directed toward filling gaps emerging from the review. This includes integrating artificial intelligence and machine learning into the execution of sustainable practices, and the role social media plays in fostering awareness. Another promising

direction involves the exploration of regional and cultural variations in the adoption of sustainable innovation, which could provide insights into localised strategies for achieving SDGs. By bridging these gaps, future studies can contribute to a more comprehensive and globally inclusive understanding of sustainability.

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