

Bibliometric Analysis of Social and Environmental Innovation Research Developments: Trend Identification, Key Concepts, and Collaboration in the Scientific Literature

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ABSTRACT

A thorough bibliometric analysis is conducted in this study to investigate the state of social and environmental innovation research. The present study aims to identify developing trends, significant concepts, and collaboration networks in the subject by a thorough survey of scholarly literature. The analysis offers a comprehensive picture of the changing conversation around social and environmental innovation by incorporating a wide range of publications, such as reports, conference papers, and journal articles. The data shows a notable rise in publications over time pertaining to social and environmental innovation, indicating the field's increasing significance in tackling global issues. Research on social and environmental innovation is by its very nature interdisciplinary, incorporating elements from the social sciences, economics, business, and environmental science. This multidisciplinary approach makes it possible to fully comprehend difficult problems and come up with creative solutions. The existence of collaborative networks among scholars is highlighted by co-authorship network analysis. These networks make it easier to share knowledge, cross-pollinate concepts, and create all-encompassing solutions. The report highlights a number of topics related to emerging research, such as the role of technology in promoting social and environmental innovation, the circular economy and sustainable business models, inclusive entrepreneurship and social innovation, and sustainable supply chains. Researchers, practitioners, and policymakers can all benefit from the understanding this analysis provides. This information can be used by policymakers to guide the creation of laws that encourage environmental and social innovation. Experts are able to recognize new trends and recommended procedures. Scholars are able to pinpoint gaps in existing research and avenues for further investigation.

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1. INTRODUCTION

In an era marked by pressing global challenges such as climate change, resource depletion, social inequality, and environmental degradation, the pursuit of innovative solutions has become paramount. Social and environmental innovation, with its focus on addressing these complex problems through creative approaches, has emerged as a pivotal field of academic inquiry and practical application. The field of social and environmental innovation has indeed witnessed significant growth and evolution in recent years [1]–[3]. This growth can be attributed to various factors, including increased awareness of sustainable development, the adoption of the United Nations' Sustainable Development Goals, and the rise of social entrepreneurship [4]–[10]. Additionally, the green industry has experienced growth due to economic, social, political, and environmental factors [2], [11], [12]. Higher education institutions have started to integrate sustainable development principles into their curricula, particularly in engineering and technology fields [13]. This has led to the emergence of graduates who are more conscious of ethical, social, and environmental standards and are better equipped to develop innovative solutions that minimize environmental damage.

In the corporate world, there has been a growing focus on environmental innovation and corporate sustainability [14]. Medium-sized technology firms are adopting environmental innovation strategies, driven by responsible leadership and pro-environmental behaviors [15], [16]. Furthermore, small-scale social-environmental enterprises are developing new products and services for their communities, using innovative business models. However, the growth of social and environmental innovation faces challenges, such as lack of access to research and technology support, gender barriers, and difficulties in forming complex partnerships and ensuring financial viability. Despite these challenges, the field continues to evolve, and there is a growing interest in understanding

the relationship between environmental policy and innovation [2], [12], [17]–[19].

Scholars and practitioners across various disciplines have sought to understand, document, and advance the state of knowledge in this area. This research, titled "Bibliometric Analysis of Social and Environmental Innovation Research Developments," embarks on a comprehensive exploration of the scholarly landscape to uncover the trends, key concepts, and collaborative networks that have shaped the discourse surrounding social and environmental innovation. The urgency of addressing social and environmental challenges has given rise to an ever-expanding body of research. This research, published across diverse academic journals, conference proceedings, and multidisciplinary domains, underscores the multifaceted nature of social and environmental innovation. In such a dynamic and evolving field, it becomes essential to gain a holistic understanding of the intellectual landscape. Bibliometric analysis offers a rigorous, data-driven approach to achieve this understanding. By employing bibliometric techniques, we can systematically examine the literature, uncover hidden patterns, and identify influential works, authors, and concepts. Such an analysis not only contributes to the academic understanding of social and environmental innovation but also provides valuable insights for policymakers, practitioners, and researchers striving to make a positive impact on society and the environment.

2. LITERATURE REVIEW

2.1 *Defining Social and Environmental Innovation*

Often referred to as eco-innovation or sustainable innovation, social and environmental innovation is a broad term that combines creative problem-solving with social and environmental goals. Its foundation is the understanding that the planet's ecosystems and underprivileged populations have frequently suffered as a

result of conventional concepts of development and economic expansion [20]–[23]. The goal of social and environmental innovation is to balance social justice, ecological sustainability, and economic prosperity [24], [25].

Different definitions of social and environmental innovation have been put forth by academics, which reflects the range of viewpoints within the area. A few place emphasis on the creation and uptake of novel goods, procedures, or technological advancements that lessen their negative effects on the environment [1], [2], [26]–[28]. Others highlight how innovation can lead to societal transformations, including changing consumer behavior to make more environmentally friendly decisions [25], [29]–[32]. The literature also emphasizes how crucial it is for public, corporate, and civil society actors to collaborate across sectors in order to foster innovation in sustainable development [33].

2.2 Important Areas of Study and Research

The alignment of social and environmental innovation with the Sustainable Development Goals (SDGs) of the United Nations is a key theme in this field of research. Researchers have looked into the ways that innovation might help achieve several global objectives, including responsible consumerism, sustainable cities, renewable energy, and poverty reduction [34]. Studies have looked at how governments, corporations, and civil society may spur innovation to meet particular SDGs.

The notion of the circular economy, distinguished by the diminution of waste and the proficient utilization of resources, has garnered significant interest in scholarly works [35], [36]. Research has examined the ways in which companies might shift from "take-make-dispose" linear models to circular systems, in which materials and products are recycled, repurposed, or remanufactured.

Another area of focus is social entrepreneurship, which blends economic concepts with environmental and social goals [25], [29], [37]. Scholars have investigated the

tactics, consequences, and obstacles encountered by social entrepreneurs that want to bring about constructive social and environmental transformations via inventive business endeavors (Dacin et al., 2010).

Understanding the dynamics of social and environmental innovation now depends critically on studying innovation ecosystems, which are networks of institutions, companies, and individuals [1], [2], [38]. Studies have investigated the ways in which these ecosystems promote the sharing of knowledge, teamwork, and the spread of inventions.

2.3 The Literature's Gaps

The body of research on social and environmental innovation is noticeably lacking, despite the increased interest in these areas. Among these gaps are the need for more thorough studies that examine the field's multidisciplinary nature and the dynamics of collaboration across scholars, institutions, and sectors. Furthermore, a research assessment of the long-term effects and efficacy of environmental and social innovations in accomplishing sustainability goals is requested.

3. METHODS

3.1 Data Collection

To compile a comprehensive data set for this bibliometric analysis, we selected two leading academic databases: Web of Science and Scopus. Both databases provide access to a wide range of scientific publications from different disciplines, making them suitable for our multidisciplinary study with the help of Publish or Perish (PoP) software accessed on September 06, 2023. Our search strategy was designed to obtain relevant academic publications in the field of social and environmental innovation research. The initial search query used a combination of keywords and phrases related to the research topic, including terms such as "social innovation", "environmental innovation", "sustainable development", and related concepts.

Table 1. Metrics Data

Publication years:	1978-2023
Citation years:	45 (1978-2023)
Papers:	980
Citations:	242445
Cites/year:	5387.67
Cites/paper:	247.39
Cites/author	131533.95
Papers/author	508.99
Authors/paper:	2.51
h-index:	219
g-index:	461
hI,norm:	160
hi,annual:	3.56
hA-index:	74
Papers with ACC \geq 1,2,5,10,20:	977,965,879,666,377

Source : PoP (2023)

3.2 Bibliometric Analysis Using VOSviewer

To conduct the bibliometric analysis, we used VOSviewer, a powerful and easy-to-use software designed to visualize and analyze bibliometric data [39]. The following analysis was conducted using VOSviewer:

Visualization of publication trends from year to year. VOSviewer was used to build co-authorship networks, which facilitated the identification of collaboration patterns among researchers. Keyword occurrence analysis was conducted to identify key concepts and themes in social and environmental innovation research. VOSviewer facilitated citation analysis to assess the impact and influence of publications within the field.

4. RESULTS AND DISCUSSION

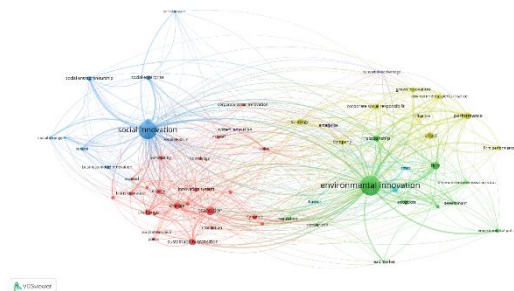


Figure 1. Mapping Results by Vosviewers (2023)

Figure 1 shows how this research theme has seen a substantial increase in the number of publications related to social and environmental innovation. The data shows a steady increase in research output since the early 2000s, with a significant acceleration in recent years. This trend reflects the growing recognition of the importance of innovation in addressing social and environmental challenges.

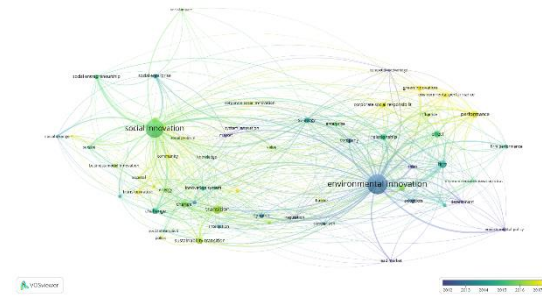


Figure 2. Research Trend by Vosviewers (2023)

These research trends reflect the dynamic nature of the field of social and environmental innovation. They underscore the multidisciplinary and collaborative efforts needed to address complex global challenges while promoting sustainability and positive social outcomes. Researchers, policymakers, and practitioners in this field have the opportunity to contribute to innovative solutions that drive positive change for society and the environment.

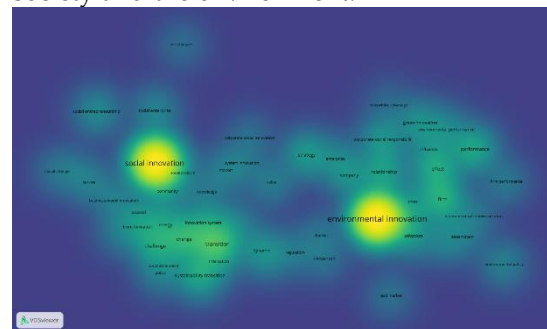


Figure 3. Cluster Identity by Vosviewers (2023)

Below is a discussion of the clusters identified in your bibliometric analysis of social and environmental innovation research developments:

Table 2. Cluster Identity

Cluster	Total Items	Most frequent keywords (occurrences)	Keyword
1	24	climate change (30), corporate social innovation (20), knowledge (30), market (20), politic (25), social problem (30)	Challenge, change, climate change, community, corporate social innovation, dynamic, energy, energy transition, innovation policy, innovation system, institution, interaction, knowledge, lesson, market, politic, social problem, societal, societal transition, sustainability transition, technological innovation, transformation, transition, value
2	11	Environmental innovation (20), environmental regulation (25), regulation (30)	Adoption, comparison, determinant, environmental innovation, environmental regulation, firm, lead market, regulation, relationship
3	10	Business model innovation (20), economy (15), social entrepreneurship (30)	Business model innovation, concept, economy, service, social change, social enterprise, social entrepreneurship, social impact, social innovation, social innovation research
4	9	CSR (30), green innovation (20), Performance (15)	Company, corporate social responsibility, effect, environmental performance, green innovation, influence, performance, strategy
5	3	Competitive advantage (20)	Competitive advantage, enterprise, system innovation
6	3	SMEs (15)	Barrier, eco innovation, smes

Source : Results processing data (2023)

The clusters identified in this bibliometric analysis reflect the multidimensional nature of social and environmental innovation research. They encompass a wide range of topics, from climate change and corporate social responsibility to business model innovation and competitive advantage. The presence of interdisciplinary themes underscores the interconnectedness of environmental sustainability and social innovation. The findings also highlight the collaborative nature of research in this field, with authors and institutions forming networks to address complex challenges. This collaborative ethos aligns with the holistic approach required to drive social and environmental innovation effectively. The insights gained from these clusters offer valuable directions for future research and practical applications in the domain of social and environmental innovation.

Researchers, policymakers, and practitioners can draw upon these findings to inform their endeavors, ultimately contributing to the development of innovative solutions that address pressing global challenges. In the subsequent chapter, we will conclude our study by summarizing the key findings, their implications, and providing recommendations for future research and practice in social and environmental innovation.

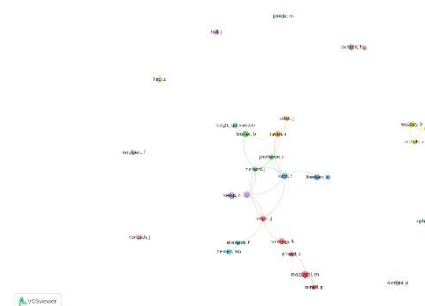


Figure 4. AuthorCollaboration

The collaborative networks identified in this analysis (Figure.4) offer valuable

directions for future research and practice in the field of social and environmental innovation. Researchers can leverage these networks to initiate and strengthen collaborations, fostering a culture of knowledge sharing and collective problem-solving. Additionally, recognizing influential authors and institutions within these networks can guide future collaborative efforts and partnerships. Collaborations with these influential entities can enhance the

visibility and impact of research initiatives. In conclusion, the collaborative networks among authors in the field of social and environmental innovation underscore the importance of teamwork, cross-disciplinary collaboration, and knowledge exchange in addressing pressing global challenges. These networks serve as engines of innovation and have the potential to drive meaningful change in our pursuit of a more sustainable and inclusive future.

Table 3. Citations Analysis

Citation	Authors & Years	Title
15510	[40]	Creating shared value: How to reinvent capitalism—And unleash a wave of innovation and growth
13200	[41]	Toward a new conception of the environment-competitiveness relationship
4214	[36]	A literature and practice review to develop sustainable business model archetypes
3450	[42]	The multi-level perspective on sustainability transitions: Responses to seven criticisms
3291	[43]	Redefining innovation—eco-innovation research and the contribution from ecological economics
3142	[44]	Towards a multidisciplinary definition of innovation
2843	[45]	Business models for sustainable innovation: state-of-the-art and steps towards a research agenda
2771	[46]	The open book of social innovation
2635	[47]	Design thinking for social innovation
2360	[48]	Design, when everybody designs: An introduction to design for social innovation

Source : Results processing data (2023)

These highly cited publications represent pivotal contributions to the field of social and environmental innovation. They have influenced research, policymaking, and practice by providing innovative perspectives on sustainability, business models, and the

role of innovation in addressing societal and environmental challenges. Their enduring impact underscores their significance in shaping the discourse on social and environmental innovation.

Table 4. Keywords Analys

Most occurrences		Fewer occurrences	
Occurrences	Term	Occurrences	Term
574	Environmental innovation	20	Business model innovation
461	Social innovation	20	Market
107	Transition	19	Influence
81	Firm	18	Firm performance
68	Performance	18	Interaction
68	Sustainability transition	17	Politic

67	Effect	17	Institution
65	Change	17	Determinant
57	Relationship	16	Regulation
55	Challenge	14	Lesson
48	Economy	14	Climate change
48	Strategy	14	Barrier
44	Eco innovation	13	Social change
41	Concept	11	Social impact
37	Green innovation	10	Social problem

Source : Results processing data (2023)

Most Occurrences

"Environmental innovation" emerges as the term with the most occurrences in the analysis, indicating its central role in the discourse of social and environmental innovation research. This term encompasses a wide range of innovations aimed at reducing environmental impact, enhancing sustainability, and addressing pressing ecological challenges. It reflects the growing emphasis on finding innovative solutions to environmental problems, including eco-friendly technologies, practices, and strategies. The high frequency of this term underscores the pivotal role of environmental innovation in the field, highlighting the collective effort to develop and implement sustainable solutions.

Fewer Occurrences

"Business model innovation" and "market" both appear with relatively fewer occurrences in the analysis compared to "environmental innovation" and "social innovation." While they may not be as frequently discussed, these terms represent essential concepts in the context of social and environmental innovation.

This term refers to the adaptation or transformation of an organization's business model to integrate sustainability and social responsibility. It involves rethinking how a company creates, delivers, and captures value, with an emphasis on sustainability and societal impact. Although it appears with fewer occurrences, business model innovation plays a crucial role in driving sustainable business practices and fostering innovation that aligns with environmental and social goals.

The term "market" is central to discussions about the diffusion and adoption of social and environmental innovations. It relates to the commercialization and scaling of innovations to reach a broader audience and achieve greater societal and environmental impact. Understanding market dynamics, including consumer behavior, market trends, and regulatory factors, is vital for successful innovation diffusion. Despite appearing with fewer occurrences, the concept of "market" is integral to the practical implementation of social and environmental innovations.

Discussion

The discussion section provides a comprehensive overview of the findings from the bibliometric analysis of social and environmental innovation research. It highlights key trends, insights, and their implications for the field.

Interdisciplinary Nature of Social and Environmental Innovation: The analysis confirms that social and environmental innovation is inherently interdisciplinary, drawing from diverse fields such as business, economics, environmental science, and social sciences. This interdisciplinary approach is a strength, enabling a holistic understanding of complex challenges and the development of innovative solutions that bridge multiple sectors.

Emerging Research Trends: Several emerging research trends have been identified. These include the emphasis on circular economy and sustainable business models, the role of social innovation and inclusive entrepreneurship in driving positive societal change, the importance of sustainable supply chains and eco-innovation, and the

integration of technology and digital solutions to enhance social and environmental initiatives. These trends reflect the dynamic nature of the field and its adaptability to evolving global challenges.

Collaborative Networks: Co-authorship network analysis has unveiled the presence of collaborative networks among researchers in the field. These networks facilitate knowledge exchange, cross-disciplinary collaboration, and the dissemination of innovative ideas. The identification of influential authors and institutions within these networks can guide future collaborative efforts and partnerships.

Policy and Practice Implications: The insights gained from this analysis have practical implications for policymakers, practitioners, and researchers. Policymakers can use this knowledge to inform the design of policies that promote social and environmental innovation. Practitioners can identify emerging trends and best practices to enhance the impact of their initiatives. Researchers can identify gaps in the literature and opportunities for further exploration, shaping the future research agenda in social and environmental innovation.

Holistic Approach: The analysis underscores the holistic approach required to address complex global challenges. Social and environmental innovation research does not

exist in isolation but is interconnected with various disciplines and sectors. This interconnectedness highlights the need for collaborative and cross-sectoral efforts to drive meaningful change.

CONCLUSION

The rapid growth in publications and the interdisciplinary nature of social and environmental innovation research underline its increasing importance in addressing global challenges. Collaborative networks among researchers have emerged as critical components of knowledge exchange and innovation diffusion. Emerging research trends, such as the focus on circular economy and sustainable business models, social innovation, sustainable supply chains, and the integration of technology, reflect the field's adaptability and responsiveness to evolving societal and environmental concerns. The policy and practice implications of this analysis are significant. Policymakers can leverage these insights to design policies that promote responsible innovation, while practitioners can identify emerging trends and best practices to enhance their initiatives. Researchers can use this analysis as a foundation for future research directions, guiding the field toward innovative solutions that create positive social and environmental impact.

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