

Green Entrepreneurship and SME Sustainability Toward the Sustainable Development Goals: A Systematic Literature Review and Bibliometric Analysis

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ABSTRACT: This study maps the global evolution of green entrepreneurship and SME Sustainability research by integrating a systematic literature review (SLR) and bibliometric analysis of Scopus-indexed publications from 2016 to 2025. Using a transparent search strategy and PRISMA protocol, we retrieved and analyzed 17 documents (Scopus) with bibliometric tools in RStudio (Bibliometrix) and VOSviewer to identify publication trends, influential authors and sources, collaboration networks, and thematic clusters. Results show a marked increase in publications after 2018, with dominant thematic clusters around green innovation, sustainable business models, and policy & finance for green SMEs. Co-authorship networks reveal regional hubs in Asia and Europe, while co-citation analysis highlights cross-disciplinary theoretical roots spanning entrepreneurship, sustainability science, and innovation management. We synthesize these findings into a conceptual roadmap linking green entrepreneurship to Sustainable Development Goals (SDGs), identify three priority research gaps (empirical micro-level performance studies, cross-country comparative analyses, and the interplay between digitalization and green practices), and propose a prioritized agenda for future research and policy. This integrated SLR-bibliometric approach provides a reproducible foundation for scholars and policymakers aiming to accelerate green entrepreneurial transitions globally.

KEYWORDS: Green Entrepreneurship, SME Sustainability, Sustainable Development Goals (SDGs), Systematic Literature Review, Bibliometric Analysis

I. INTRODUCTION

Global economic transformation towards a sustainable economy presents complex challenges for micro, small, and medium enterprises (MSMEs) in developing countries, particularly in integrating green entrepreneurship practices. Green entrepreneurship, defined as entrepreneurial activities that embed environmentally friendly practices into business models including sustainable product innovation, resource efficiency, waste reduction, and green technology adoption, serves as a strategic instrument to achieve MSME sustainability and contribute to Sustainable Development Goals (SDGs) (Demirel et al., 2019; Lotfi et al., 2018; Sharma et al., 2022; Wicaksono, 2025). MSMEs represent over 90% of employment in developing economies and significantly contribute to GDP (World Bank, 2023), yet only a small fraction incorporate sustainable practices into their operations (UNCTAD, 2022). This gap between the potential of MSMEs as economic drivers and their limited adoption of sustainability practices creates a development paradox requiring evidence-based comprehensive solutions.

A fundamental issue faced by MSMEs in developing countries is the multidimensional implementation gap of green entrepreneurship. Resistance to change, high initial investment costs, and absence of comprehensive progress measurement tools represent major barriers to green economic transitions. Developing economies face unique challenges such as surging energy demand and limited access to sustainable technologies. Working capital constraints and difficulties in obtaining external financing force many MSMEs to rely on internal funds, restricting their growth potential (Endris & Kassegn, 2022; Mittal & Raman, 2021; Rajamani et al., 2022). Moreover, MSMEs often lack both financial resources to invest in green technologies and knowledge about sustainability benefits and implementation methods (Dzomonda, 2022; Hunjra et al., 2023; Ronaldo & Suryanto, 2022). Weak government regulations and limited incentives further exacerbate this, weakening motivation for MSMEs to transition towards sustainable business models (Dzomonda, 2022; Tariq & Hassan, 2023; Zhang et al., 2021). Khan et al. (2021) reinforce these findings, demonstrating that despite green innovation improving MSME competitiveness in South Asia, technology and finance access remain critical obstacles.

The multidimensional consequences of delayed green entrepreneurship adoption create a negative cycle, hindering MSME sustainability under the triple bottom line framework. Economically, MSMEs suffer reduced global competitiveness, loss of access

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to rapidly growing sustainable markets, and inability to leverage emerging green investment opportunities. Environmentally, increased operational carbon footprints, ecosystem degradation from unsustainable production, and contributions to global climate change prevail. Socially, disparities emerge in access to sustainable business practices, declining quality of life for communities near MSME operations, and lost potential for green job creation vital for inclusive development. MSME sustainability—the ability to maintain long-term operations integrating economic, social, and environmental dimensions—is compromised by imbalance between short-term profit orientation and long-term sustainability investment (OECD, 2024). This directly obstructs MSMEs' contributions to SDGs, particularly SDG 8 (sustainable economic growth), SDG 9 (industry, innovation, and infrastructure), SDG 12 (responsible consumption and production), and SDG 13 (climate action).

This research addresses the need to reconcile economic growth with environmental sustainability by operationalizing the sustainable development theory, emphasizing balanced triple bottom line integration in green entrepreneurship practices. An integrated conceptual framework emerges by coupling entrepreneurship theory—viewing entrepreneurs as agents of change and innovation—with resource-based view theory, enabling the understanding of how MSMEs transform resource constraints into competitive sustainable advantages. Recent findings position green entrepreneurship as a key driver of MSME sustainability amidst stringent market demands and regulatory environments (Mondal et al., 2024; Reniati & Faisal, 2024; Tekala et al., 2024). Green entrepreneurship also fosters economic stability via new market creation, long-term cost efficiencies, and consumer preference for eco-friendly products (Manoharan et al., 2024; Tekala et al., 2024; Wicaksono, 2025). This theoretical framework gains importance with paradigmatic evolution from corporate social responsibility as an add-on to an integrated green business model positioning sustainability at the core strategy (Cici & D'Isanto, 2017).

Practically, the urgency intensifies given the disrupted path towards SDG 8 due to COVID-19's adverse impact on structurally fragile MSMEs (Saturwa et al., 2021). SDG 2030 prioritizes inclusive economic growth, industrial innovation, and climate action, demanding active MSME engagement as economic backbone in developing nations. Global trends reveal rising investor and consumer preference for sustainable products, driving MSMEs to evolve or face marginalization risks (Koe et al., 2024). Green business investments and progress towards net-zero emissions offer MSMEs key benefits such as operational efficiencies via resource optimization, access to premium sustainable markets, and resilience against tightening environmental regulations (Omowole et al., 2024). These factors create strategic momentum necessitating deep understanding of multidimensional green entrepreneurship implementation specific to developing countries.

The existing literature on green entrepreneurship reflects significant conceptual and methodological diversity. Studies have explored its economic implications (Zhang et al., 2021), drivers of green innovation (Mittal & Raman, 2021), policy and institutional support (Khan et al., 2021), and behavioral aspects of sustainability-oriented entrepreneurs (Hunjra et al., 2023). Yet, these contributions remain dispersed, lacking a unified understanding of how the field has evolved, which themes dominate, and what theoretical underpinnings guide its development. Moreover, while bibliometric studies have been conducted on related areas such as sustainable entrepreneurship (Sreenivasan & Suresh, 2023) and green innovation (Omowole et al., 2024), few have systematically mapped the global intellectual structure of green entrepreneurship research by integrating bibliometric and content-based evidence.

In addition, the proliferation of research publications in the aftermath of the COVID-19 pandemic has accelerated scholarly attention to resilience, sustainability, and green recovery. This surge underscores the need for a comprehensive synthesis and mapping of global research trends to identify emerging themes, collaborative networks, and future research directions. Without such synthesis, the field risks conceptual ambiguity and theoretical fragmentation, which may limit its potential contribution to policy and practice in sustainable business development. Employing a multidimensional approach via systematic literature review (SLR), this research integrates analysis of economic growth, innovation, and environmental impact dimensions simultaneously. The economic dimension explores green entrepreneurship's role in MSME productivity and competitiveness; the innovation dimension examines green technologies and sustainable business model transformations; the environmental dimension evaluates MSMEs' contributions to climate change mitigation and SDGs. The SLR method facilitates transparent, replicable identification of research trends, gaps, and future directions supported by scientific evidence, tailored to the unique resource constraints, institutional capacities, and structural challenges in developing economies requiring contextualized sustainability integration.

Therefore, this study aims to provide an integrated and systematic overview of the global evolution of green entrepreneurship research between 2016 and 2025. By combining the Systematic Literature Review (SLR) and bibliometric analysis using RStudio (Bibliometrix) and VOSviewer, this study identifies major research streams, influential authors and countries, collaboration patterns, and thematic developments over time. The novelty of this research lies in its multidimensional mapping of green entrepreneurship that bridges economic, environmental, and innovation perspectives under the SDG framework.

This study contributes in three main ways. First, it provides a transparent and reproducible bibliometric synthesis of green entrepreneurship literature indexed in Scopus, revealing publication trends and intellectual structures at the global level. Second, it identifies dominant and emerging research themes, highlighting conceptual interlinkages between green innovation, sustainable SMEs, and circular economy transitions. Third, it proposes a research agenda that outlines theoretical and methodological gaps, offering guidance for future studies and policy formulation aimed at advancing sustainable entrepreneurship globally.

II. RESEARCH METHODOLOGY

A. Keywords and Search Strings

This study uses the Systematic Literature Review (SLR) approach to synthesize the latest knowledge on green entrepreneurship and MSME sustainability in relation to the achievement of the SDGs in developing countries. The search strategy is carried out on the Scopus database because Scopus is one of the largest databases that has a wide coverage of internationally reputable journals, indexing Q1–Q2, and providing metadata that can be processed with bibliometric tools such as VOSviewer and RStudio. The keywords used were determined through Boolean operators ("AND") taking into relevant articles of the topic, namely: "Green Entrepreneurship", "Green Entrepreneurship" AND "Sustainable Development Goals", and "Green Entrepreneurship" AND "SME Sustainability". The combination of these keywords resulted in a phased search consisting of 498 articles for general keywords (green entrepreneurship), 41 articles for keywords related to the SDGs, and 17 articles for keywords more specific to SME sustainability.

The article selection process is carried out based on clear inclusion and exclusion criteria. The inclusion criteria carried out by the researcher include: Articles published in international journals indexed by Scopus, articles in the period of 2015–2025 to ensure relevance to the SDGs agenda, articles in English, articles with the format of research articles, reviews, or conference papers that have empirical data or conceptual analysis related to green entrepreneurship, SME sustainability, and SDGs. Duplicate articles from multi-keyword searches, articles that are editorial, book review, or non-peer reviewed, and articles that are irrelevant or do not address economic, innovation, or environmental dimensions.

B. Data Screening and Analysis

The data screening and analysis process is carried out in stages following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. The initial stage begins with a search of the Scopus database, using a predetermined combination of keywords. All articles are combined in one initial database to be selected. The initial stage was the identification stage which produced 498 documents, but there were 8 duplicates that were immediately deleted. Furthermore, Scopus' automated system marked 25 articles as ineligible, because they did not have complete metadata or were outside the category of peer-reviewed scientific publications. In addition, 105 articles were excluded for other reasons, such as editorials, book reviews, or short reports that did not meet the inclusion criteria of this study. Thus, at the end of the identification stage, there are 360 articles left that enter the screening stage.

At the screening stage, 360 articles were further examined by reading titles and abstracts. Of these, 40 articles were issued because they were not relevant to the focus of the research, for example only discussing technological innovations unrelated to green entrepreneurship or emphasizing environmental policy aspects without discussing MSMEs. After this stage, there are 320 articles left that are considered relevant enough to be examined in more depth. The eligibility stage was carried out by examining the complete text of the 320 articles. However, of these, 279 articles were not accessible in full version or were found to be incompatible with the focus of the research upon further examination. For example, some articles do use the term green entrepreneurship, but the context is on large companies, not MSMEs, or focuses more on macro policies that are not directly related to green entrepreneurship practices. In the end, only 41 articles passed the full eligibility assessment stage. At this stage, a more detailed evaluation of 41 articles was conducted, taking into account three main criteria: (1) whether the article discusses the relationship between green entrepreneurship and the sustainability aspect of MSMEs, (2) whether the article explicitly links the findings to the achievement of the SDGs, and (3) whether the article is in the context of developing countries. From the results of the evaluation, 24 articles were removed because they did not meet one or more of the above criteria.

The last stage is inclusion, where 17 articles are obtained that truly meet the research inclusion criteria. This article is then further analyzed using bibliometric and content analysis approaches. The final article distribution reflects the strong research focus on green entrepreneurship, sustainable innovation, and the contribution of MSMEs to the SDGs, particularly in developing countries. The results of this selection process are visualized in the PRISMA Flow Diagram (Figure 1), which shows the elimination flow of articles from the identification stage to the final article included in the analysis.

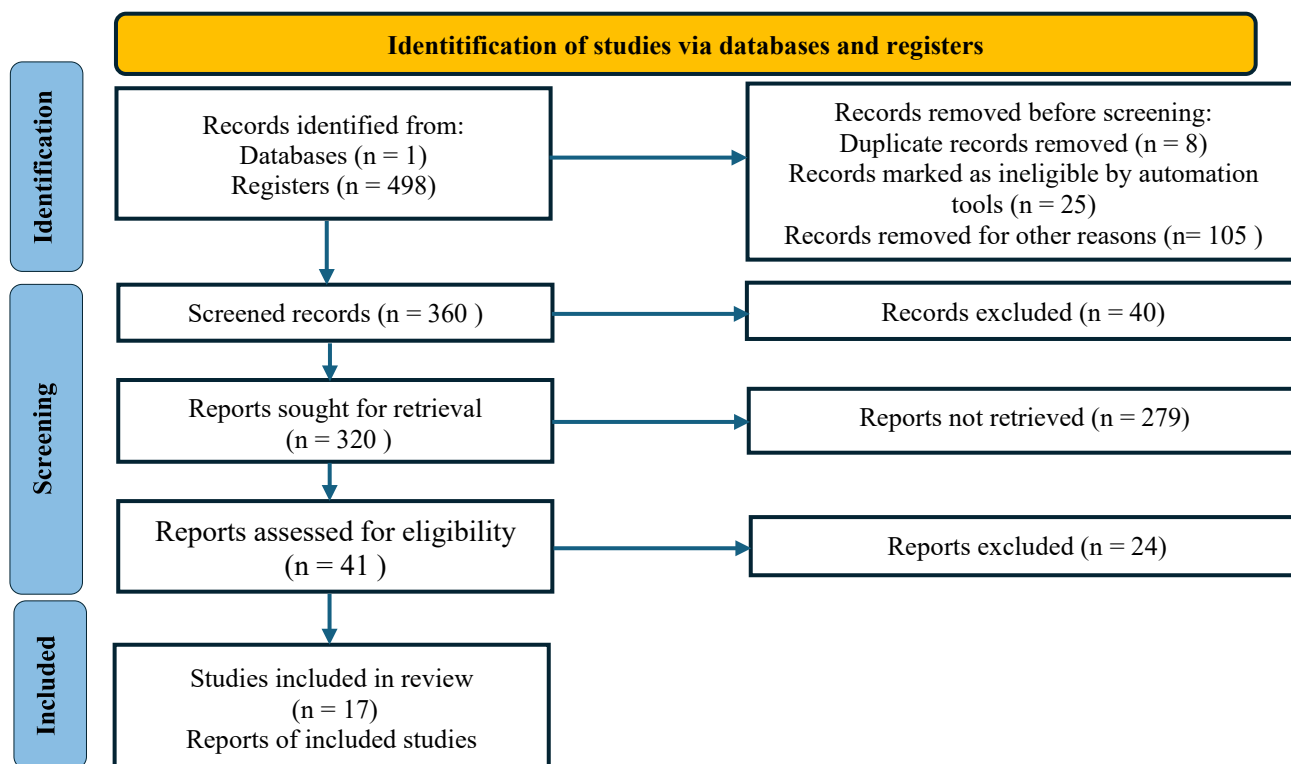


Figure 1. PRISMA Flow Diagram.

C. Analytical Tools

Data analysis in this study was carried out with a bibliometric approach equipped with content analysis. The purpose of using these two approaches is to obtain a comprehensive picture of the dynamics of research on the topic of green entrepreneurship and the sustainability of MSMEs, both in terms of quantitative (publication trends, collaboration, citations) and qualitative (content and theme of the study). This study utilizes VOSviewer and RStudio for bibliometric analysis. VOSviewer is used for its strong ability to visualize scientific networks, particularly for keyword co-occurrence maps, co-authorship maps between authors and countries, and co-citation maps between references. Using VOSviewer, this study can identify the main clusters that form the knowledge structure in the field of green entrepreneurship and how they relate to SME sustainability and SDGs. The resulting visualizations, such as keyword network maps or author collaborations, provide an intuitive view of the direction of research that is developing and areas that are still limited.

Meanwhile, RStudio is used to process publication metadata obtained from Scopus, including the distribution of articles by year, country, journal, and author. Through bibliometric packages such as Bibliometrix and Biblioshiny, RStudio enables more in-depth statistical analysis of publication data, such as calculating the number of publications per year, research growth patterns, and identifying the most productive journals and authors. The use of RStudio also helps in extracting more detailed data to support the interpretation of bibliometric results visualized with VOSviewer.

In addition to bibliometric analysis, this study also uses content analysis to understand the substance of articles that have passed the final selection (17 articles). Each article is manually analyzed to identify the main themes that are in accordance with the focus of the research, namely: (1) the contribution of green entrepreneurship to economic growth, (2) the role of green entrepreneurship in encouraging green innovation and the sustainability of MSME businesses, and (3) the impact of green entrepreneurship on the environment within the framework of achieving the SDGs. Through this approach, the research not only maps research trends quantitatively, but also elaborates the substantive contribution of each article. This dual approach provides a methodological advantage. Bibliometric analysis allows the identification of global patterns, research trends, and the most influential literature, while content analysis provides a depth of understanding of how the concept of green entrepreneurship is positioned in the academic literature, particularly in the context of developing countries. The combination of the two ensures that the results of the research are not only descriptive, but also interpretive, so that they can make a more meaningful contribution both theoretically and practically.

III. BIBLIOGRAPHIC FINDINGS

A. Annual Scientific Production

Bibliometric analysis was first conducted to provide an overview of the publications analyzed in this study. A total of 17 articles that met the inclusion criteria were mapped based on the year of publication, type of document, publication source (journal), country

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of origin of the author, and number of citations. The bibliometric findings show that the influence of Green Entrepreneurship on the sustainability of small, micro, and medium enterprises in the context of the SDGs has attracted the attention of researchers for many years, seen in Figure 2.

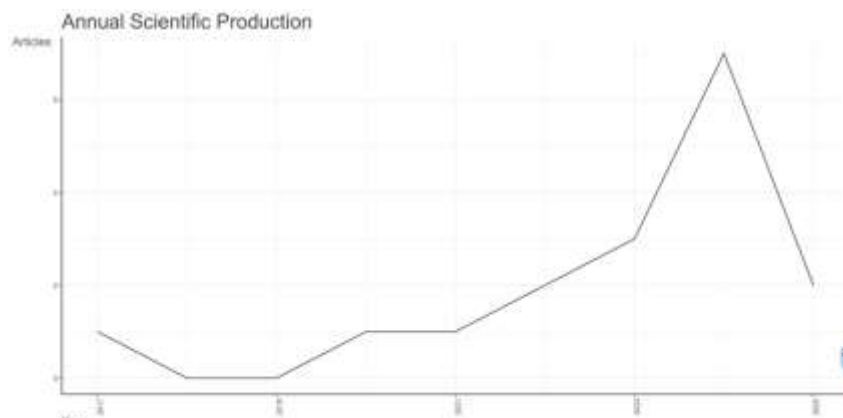


Figure 2. Publication Distribution per Year

Analysis of the 17 articles that passed the selection shows that research interest in this issue is still relatively new but shows a growing trend that has become stronger in the last five years. The earliest publication in this dataset was found in 2020 with just one article, followed by one article in 2021, two articles in 2022, three articles in 2023, and a peak of growth in 2024 with seven articles, before finally having two articles in the early 2025 period. This pattern shows a significant acceleration in the related literature, especially after 2020. The surge in publications since 2020 can be attributed to several factors. First, the COVID-19 pandemic has triggered a new awareness of the importance of a more resilient and sustainable business model (Gregurec et al., 2021). Many MSMEs in developing countries are under great pressure due to the pandemic, thus prompting the attention of academics to the potential of green entrepreneurship as an adaptive solution that not only emphasizes economic recovery, but also environmental and social sustainability. Second, the global momentum towards achieving the 2030 SDGs target is getting stronger, so that research related to the contribution of MSMEs in the sustainability agenda gets a higher priority in academic discourse.

From a temporal perspective, the distribution of this publication shows that research on green entrepreneurship is still in the early growth phase (emerging research field). The absence of publication before 2020 in this dataset indicates that the issue of green entrepreneurship and its relationship with the SDGs has relatively recently emerged as a systematic research agenda. However, the rate of increase in annual publications suggests that the field is moving towards a consolidation phase, where more and more researchers from various disciplines are starting to pay attention to this topic. This pattern is similar to the development of the green innovation literature in the previous decade, which also started with a small number of publications before experiencing exponential growth over a period of five to seven years.

The phenomenon of peak publication in 2024 can be interpreted as an indication that this topic has entered the international research agenda more seriously. The increasing number of publications shows the increasing recognition of the importance of the role of MSMEs in achieving sustainable development, both through green innovation, resource efficiency, and the creation of economic value in line with environmental protection. This is consistent with the latest findings from (Bhanage., 2025) which shows that the adoption of green entrepreneurship practices is increasingly seen as a key strategy to support the long-term sustainability of MSMEs, especially in developing countries that face global market pressures and limited resources.

B. Distribution of Author Countries

In the geographical context, the results of this study show that Indonesia occupies the dominant position with 10 articles, making it the main contributor to the literature on green entrepreneurship and the sustainability of MSMEs in developing countries. Indonesia's strong representation also encourages Asia's dominance in this field of research, strengthened by the contributions of Iran (7 articles), Saudi Arabia (7 articles), Malaysia (5 articles), and India (4 articles). These findings underscore the growing role of Asia in the global discourse on sustainable entrepreneurship, in line with the region's economic dependence on MSMEs and increasing policy attention to environmental challenges. Indonesia, despite being often criticized for environmental degradation due to deforestation and resource exploitation, shows that its academic community positions green entrepreneurship as a strategic path to balance economic growth with sustainability. Indonesia's economy and national policies in recent years have increasingly integrated innovation and sustainability agendas, in line with the green economy roadmap and commitment to the SDGs.

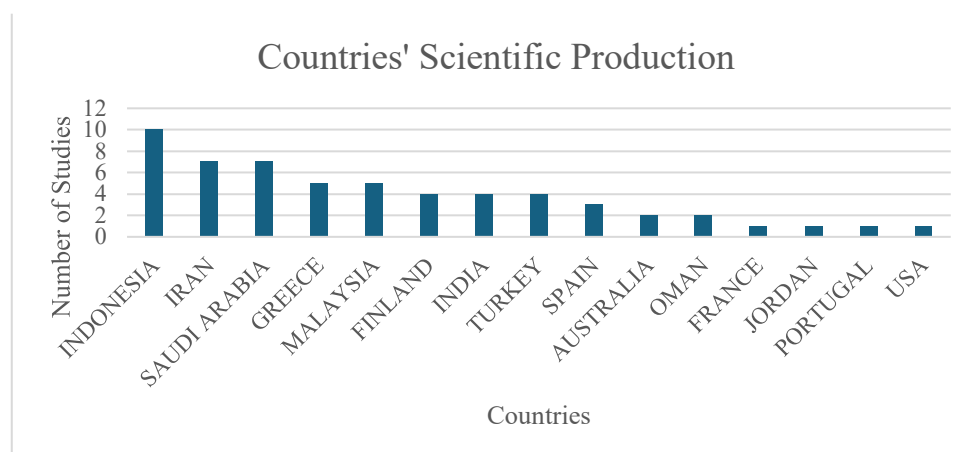


Figure 3. Distribution of Author Countries

Iran and Saudi Arabia made important contributions with 7 articles each, underscoring the Middle East region's high concern for sustainable economic transformation. Saudi Arabia's commitment through Vision 2030 and Iran's economic diversification initiatives show a strong push to reduce dependence on oil and increase green innovation. Publications from the two countries examine many obstacles to the adoption of green entrepreneurial practices in MSMEs as well as policy strategies that can strengthen global competitiveness. The active involvement of these countries shows that the issue of green entrepreneurship is not only an academic agenda, but also a long-term economic development strategy in the region that is facing energy transition pressures. Europe also made significant contributions through Greece (5 articles), Finland (4 articles), Turkey (4 articles), and Spain (3 articles). Publications from these countries show variations in research focus. Greece and Turkey place a lot of emphasis on the integration of MSMEs with EU policies related to the green economy, while Finland highlights technological innovations and knowledge-based business models that support sustainability. Spain contributed through a study on the dynamics of the MSME sector in the transition to a low-carbon economy. These findings show that although most MSMEs in Europe face different structural conditions than developing countries, their role in the green entrepreneurship agenda remains relevant in the global context.

The Southeast Asia and South Asia regions showed additional contributions through Malaysia (5 articles) and India (4 articles). The research from Malaysia is in line with national policies such as the Green Technology Master Plan 2017–2030 which emphasizes the importance of green innovation in the MSME sector. India, on the other hand, focuses the study on environmental pressures and the need for more inclusive sustainable development, with MSMEs as the main drivers. Australia (2 articles) and Oman (2 articles) also contributed although relatively small numbers, which suggests cross-continental involvement in this literature. Developed countries such as France (1 article), Portugal (1 article), and the United States (1 article) show limited involvement in this topic. This is interesting considering that their research capacity is quite large, but attention to green entrepreneurship in the context of MSMEs and SDGs is relatively small. This condition confirms that research on green entrepreneurship is more developed in developing countries that face direct pressure related to dependence on MSMEs and limited resources.

The distribution of the author's country shows two important patterns. First, research on green entrepreneurship in relation to MSMEs and SDGs is more produced by developing countries than developed countries. This condition shows the real urgency of the issue of sustainability of MSMEs in developing countries which are highly dependent on the contribution of this sector to the economy. Second, the involvement of countries with different economic backgrounds confirms that green entrepreneurship is seen as globally relevant, although its implementation is heavily influenced by the local context. Overall, these findings show that the green entrepreneurship literature is increasingly internationally recognized, with major contributions from developing countries, but still requires cross-border collaboration to produce more comprehensive and applicable insights to support the achievement of the SDGs.

Overall, the bibliometric findings indicate that green entrepreneurship has evolved from a niche environmental management topic into a mainstream interdisciplinary domain integrating innovation, policy, and sustainability perspectives. The dominance of publications in high-impact journals and the increasing collaboration among Asian and European institutions underscore its global significance. However, geographic and thematic imbalances persist, highlighting the need for greater representation from developing economies and cross-disciplinary research approaches.

IV. CONTENT ANALYSIS

The data that has been obtained from the Scopus database is then downloaded in RIS format which is then processed using VOSviewer software to obtain the results of bibliometric analysis. The researcher selected the keywords that appeared simultaneously that were used by at least 2 documents simultaneously, then adjusted them to the research phenomenon related to

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green entrepreneurship on the sustainability of MSMEs. The following are the trends of green entrepreneurship research on the sustainability of MSMEs shown in the figure below.

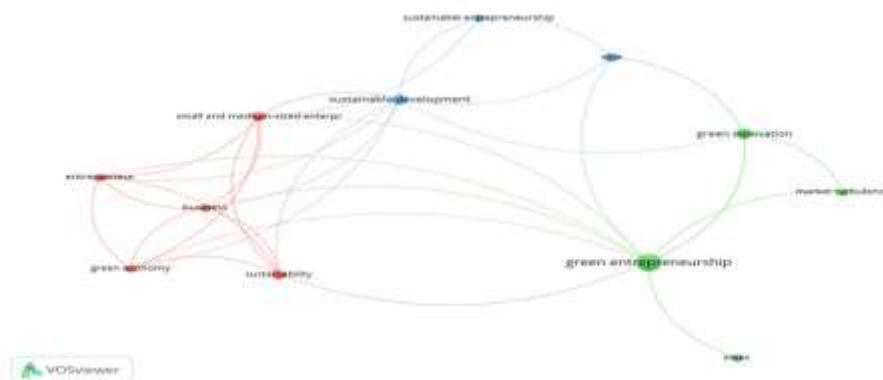


Figure 4. Network Visualization of Shared Keyword Emergence

The results show a co-occurrence map that illustrates how the concept of green entrepreneurship relates to other topics in the related literature. The dominant keywords that emerged were green entrepreneurship, sustainability, small and medium-sized enterprises (SMEs), sustainable development, and green innovation. These findings show that research on green entrepreneurship does not stand alone, but is closely related to the dimensions of sustainability, innovation, and the role of MSMEs in supporting the achievement of the SDGs in developing countries. The keyword "green entrepreneurship", the larger the circle, the keyword has been widely used by researchers related to the sustainability of MSMEs. For more details, you can see the following table.

Table 1. The Most Emerging Keywords related to Green Entrepreneurship for the sustainability of MSMEs

No	Keywords	Co-occurrence
1	Business	2
2	Entrepreneur	2
3	Green Economy	2
4	Green Entrepreneurship	10
5	Green Innovation	4
6	Market Turbulence	2
7	small and medium-sized enterprises	3
8	SME	3
9	Smes	2
10	Sustainability	3
11	Sustainable Development	4
12	Sustainable Entrepreneurship	2

In Table 1. it can be seen that green entrepreneurship is in great demand by researchers as shown by the use of 10 co-occurrences. Followed by green innovation and sustainable development as many as 4 co-occurrences. Other keywords are small and mediumsized enterprises, SMEs, and sustainability as many as 3 co-occurrences, and the keywords business, entrepreneur, green economy, market turbulence, SMEs, and sustainable entrepreneurship are also included. The results of the network visualization in Figure 2 show that there are 3 clusters with 12 items regarding green entrepreneurship for the sustainability of MSEs, namely: 1) Cluster 1 (in red) consists of 5 items (business, entrepreneur, green economy, small and medium-sized enterprise, sustainability); 2) Cluster 2 (green) consists of 4 items (green entrepreneurship, green innovation, market turbulence, SMEs); 3) Cluster 3 (in blue) consists of 3 items (SME, sustainable development, sustainable entrepreneurship).

The results of this co-occurrence analysis provide an overview of the main focus of the research, where green entrepreneurship is the center of attention that is closely connected to innovation, sustainability, and the role of MSEs in sustainable development. However, aside from keyword mapping, it's also important to look at how the patterns of collaboration between countries on this topic are shown in the image below.

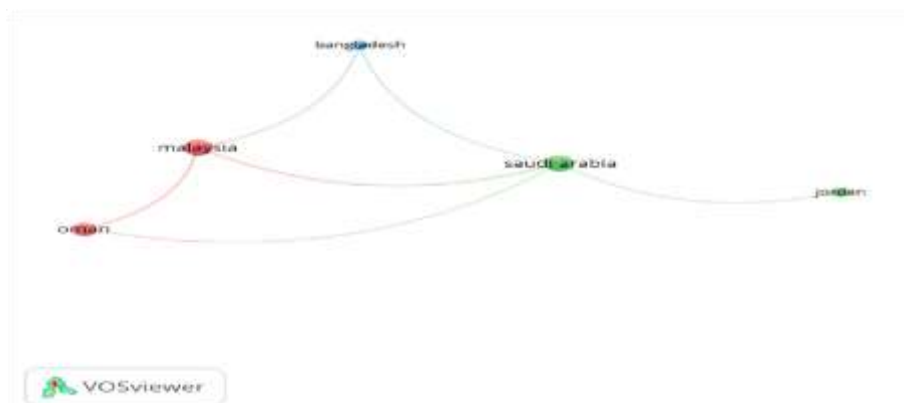


Figure 5. Visualization of Interstate Collaboration Networks

Analysis of co-authorship in Figure 5. show the collaboration network between countries involved in green entrepreneurship research. It can be seen that there are several countries that have formed cooperative relationships, although the intensity of collaboration is still limited to small clusters. Saudi Arabia emerged as a center of collaboration with larger nodes, signaling a more dominant contribution of publications. The country collaborates closely with Malaysia, Bangladesh, and Jordan, while Malaysia also plays an important role as a link between the Middle East and Southeast Asia regions, with additional collaborations with Oman. Other countries such as Bangladesh, Oman, and Jordan have smaller contributions, but they still play a role in expanding international research networks. These findings show that research on green entrepreneurship and the sustainability of MSMEs is still concentrated in several specific countries, especially in the Middle East and Asia regions. This limited international collaboration is an opportunity to strengthen cross-border cooperation so that research in the field of green entrepreneurship can develop more inclusively and contribute more to the achievement of the SDGs globally.

After understanding the pattern of author collaboration, it is important to review the substantial focus of the literature through keyword analysis. Visualization of the proportion of keywords in the form of a tree map in Figure 6. It provides a clearer picture of the dominant themes studied in the literature, as well as showing the direction of research development in this field. Thus, the tree map not only complements the analysis of collaborative networks, but also strengthens the understanding of the conceptual dimensions that shape the literature on green entrepreneurship and the sustainability of MSMEs within the framework of the SDGs. Keywords with larger box sizes represent a higher frequency of occurrences, thus providing an idea of the dominant focus in the literature. The results of the tree map show that "green entrepreneurship" is the most prominent keyword with 10 appearances (13%), indicating that this term is the center of attention as well as the main common thread in the research. This dominant position is in line with the research objectives which focus on the analysis of the relationship between green entrepreneurship and the sustainability of MSMEs and the achievement of sustainable development goals.

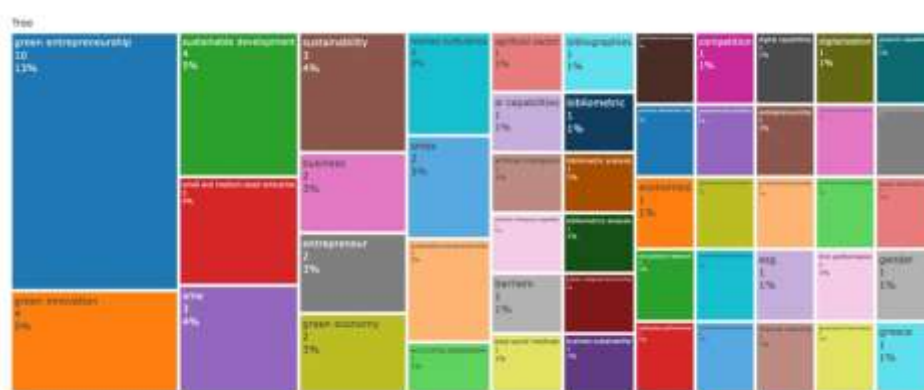


Figure 6. Visualization of Keyword Proportions

In addition, other keywords that are quite prominent are "green innovation" (4 appearances, 5%) and "sustainable development" (4 appearances, 5%). Both emphasized the close link between green entrepreneurship and green innovation and its strategic role in supporting the sustainable development agenda. This focus is in line with the current literature that emphasizes that green entrepreneurship not only generates economic value, but also contributes to environmental improvement through environmentally friendly innovations (Prokopenko et al., 2024). The tree map also shows that the keywords "sustainability" (3 appearances, 4%), "small and medium-sized enterprises" (3 appearances, 4%), and "SME" (3 appearances, 4%) occupy important positions. The

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appearance of this keyword emphasizes the relevance of the topic of MSMEs as the main context in the literature discussion. MSMEs are seen as key actors in the implementation of green entrepreneurial practices, especially in developing countries whose economies are heavily dependent on this sector. This strengthens the argument that research on green entrepreneurship cannot be separated from the discussion of the sustainability of MSMEs as the backbone of the global economy (Zonna Lia & Fitri, 2023).

Other keywords that also appear even though with a lower frequency include "business", "entrepreneur", and "green economy" with 2 appearances each (3%), as well as additional terms such as "market turbulence", "sustainable entrepreneurship", and "SMEs" with 2 appearances (3%). This variation shows that the literature is beginning to explore more diverse dimensions, including the context of market uncertainty, the sustainability of entrepreneurial models, and the transformation towards a green economy. Interestingly, the tree map also shows the presence of keywords with low frequency but still conceptually important, such as "barriers", "environmental sustainability", "gender", "digitalization", and "equity financing". Although the percentage is only about 1%, the terms open up more specific space for further research. For example, the keyword "barriers" indicates the existence of structural barriers in the implementation of green entrepreneurship by MSMEs, while "gender" indicates a social dimension that is still rarely explored.

The results of the previous tree map analysis showed a quantitative distribution of the proportion of keywords that emphasized the dominance of green entrepreneurship, green innovation, sustainable development, and their relationship with MSMEs. To complete the findings, the word cloud visualization is as shown in Figure 7. It is used to emphasize the intensity of the appearance of the main keyword in the form of a visual representation that highlights the font size according to the frequency of its use. Word cloud not only confirms the dominant keywords of the tree map, but also provides an intuitive picture of the thematic focus in the literature, making it easier to identify core concepts and emerging themes.



Figure 7. Word Frequency Visualization

Visualization in Figure 7. shows that "green entrepreneurship" appears as the largest and most dominant keyword, reflecting its central role in the overall research. This dominance is in line with the focus of the study that places green entrepreneurship as the main conceptual framework to bridge the dimensions of economic growth, business innovation, and environmental sustainability. The large size of these keywords also indicates that research in this field consistently uses the term as a theoretical and empirical foundation, thus forming a clear identity of the discipline. Other keywords that also stand out in word cloud are "sustainable development", "green innovation", "sustainability", and "small and medium-sized enterprises (SMEs)". The relatively large size of these terms shows the close relationship between green entrepreneurship and the sustainable development agenda and the role of MSMEs as the main actor in its implementation. "Green innovation" shows that sustainability cannot be separated from the process of innovating products, services, or business models, while "sustainable development" links it to the achievement of the SDGs on a macro level. Terms such as "green economy", "sustainable entrepreneurship", "business", and "entrepreneur" also appear quite prominently even though they are smaller in size than the main keywords. The existence of the term indicates that the literature does not only focus on environmental aspects, but also includes economic and managerial dimensions that contribute to the successful implementation of green entrepreneurship.

On the other hand, relatively small keywords such as "gender", "barriers", "digitalization", and "equity financing" indicate that research areas are still limited, but hold the potential for more in-depth study development in the future. For example, the keyword "gender" can open up discussions about the role of gender equality in encouraging green entrepreneurship, while "digitalization" represents the need for MSMEs to integrate digital technology in sustainability strategies. Word cloud also shows a wider variety of topics than tree maps, as it displays a variety of additional keywords albeit with low frequency. This diversity indicates that research on green entrepreneurship is in a phase of developing towards multidimensional, with links to cross-field issues such as environmental psychology, entrepreneurial motivation, and government policy interventions. This condition is consistent with the

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findings (Sharma et al., 2022) which emphasizes that green entrepreneurship is no longer just seen as a narrow economic concept, but rather as a holistic framework that integrates social, technological, and environmental aspects.

Word cloud analysis shows the main keywords that appear most often, but does not fully describe the conceptual relationships between the research themes. The next step is to explore thematic relationships and positions through thematic map analysis to identify themes that are main, developing, or declining. This analysis shows how the concepts of green entrepreneurship and the sustainability of MSMEs are interconnected within the framework of the global literature, as well as showing the direction of research evolution that supports the achievement of the Sustainable Development Goals (SDGs).

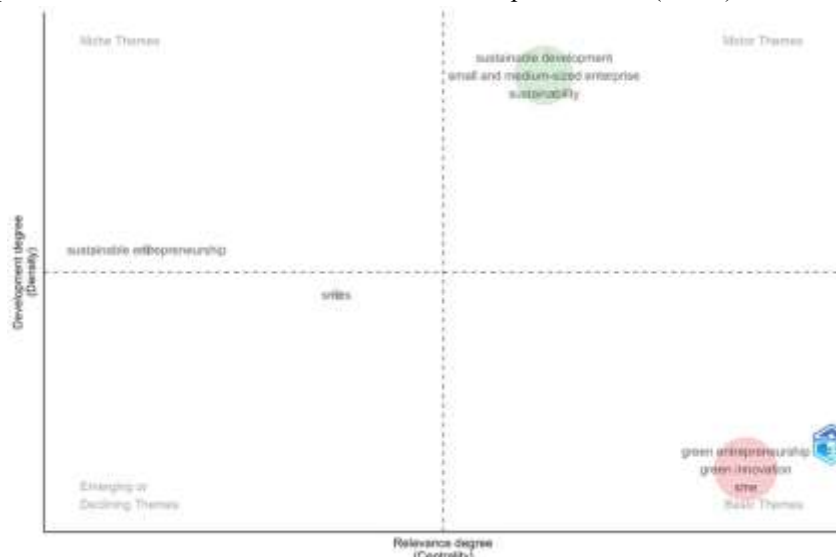


Figure 8. Thematic Map

Thematic map analysis in Figure 8. provide a conceptual overview of the structure and dynamics of research related to green entrepreneurship and the sustainability of MSMEs. This map is built on two main dimensions, namely the degree of development (density) which describes the maturity of the topic, and the degree of relevance (centrality) which shows the importance of the topic in the overall research network. Based on the visualization results, the thematic map is divided into four main quadrants, each representing the thematic position of the literature: motor themes, niche themes, basic themes, and emerging or declining themes. The themes in the upper right quadrant (motor themes) reflect conceptually strong topics and have a close relationship with other areas of research. In these results, themes such as "sustainable development," "small and medium-sized enterprises," and "sustainability" occupy these positions, indicating that the literature places all three as the main axis of research. This theme shows maturity and high relevance because it is directly connected to the main goals of the SDGs, especially in the context of economic development and environmental sustainability.

The upper left quadrant (niche themes) shows themes that have high density but still have limited relevance to the overall literature. The term "sustainable entrepreneurship" appears in this position, indicating that although this topic has a fairly mature conceptual development, the space for its application in the context of green entrepreneurship is still relatively limited. This condition provides an opportunity for further research to strengthen the connection between the concept of sustainable entrepreneurship and green entrepreneurship practices in the MSME sector. The bottom right quadrant (basic themes) displays topics of high relevance but low density, which means that these themes are the basis of the study but are still evolving in terms of conceptual enrichment. The themes of "green entrepreneurship," "green innovation," and "SME" occupy this position, confirming that the literature still focuses on the main foundation of green entrepreneurship and environmentally friendly innovation as the core of MSME sustainability development. This position also shows that research on green entrepreneurship is still in an evolutionary phase towards theoretical maturity, where researchers continue to explore the relationship between green innovation and economic growth.

The bottom-left quadrant (emerging or declining themes) did not show the dominant themes in this analysis, which means that no topic was completely left out in the literature. This condition indicates that research on green entrepreneurship and the sustainability of MSMEs is in a stable and directed growth stage, without any decline in interest in the main themes. The thematic analysis that has been explained provides an overview of the strength and relevance of the main themes in green entrepreneurship research and MSME sustainability. The analysis shows the position of each theme in the context of literature development, but does not show a logical connection between concepts conceptually. To complete this understanding, the analysis was continued with a concept map that highlighted the relationship between the core themes, the direction of research development, and the gaps that still exist in the literature related to green entrepreneurship and SME sustainability.

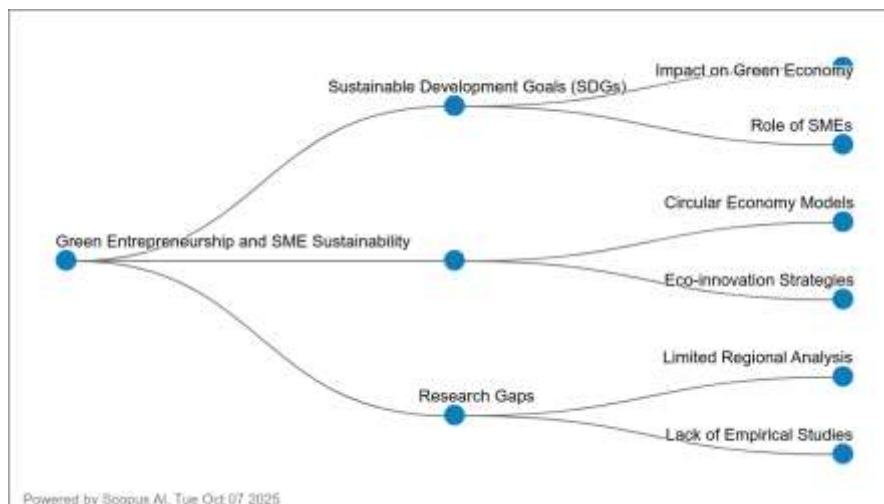


Figure 9. Concept Map

Visualization in Figure 9. shows the conceptual relationship between the main themes in the literature on green entrepreneurship and SME sustainability. This visualization shows that research in this field is centered on three main clusters of ideas, namely economic sustainability through the Sustainable Development Goals (SDGs), green innovation strategies that include circular economy models and eco-innovation, and research gaps that still need to be further explored. The linkage between green entrepreneurship and the SDGs illustrates the direct contribution of environmentally friendly entrepreneurial practices to sustainable development, especially in supporting the green economy and strengthening the role of MSMEs as the main drivers of economic transformation in developing countries. The mapping results show that the circular economy model and green innovation strategy emerged as the most widely used conceptual approaches in assessing the impact of green entrepreneurship on the performance and sustainability of MSMEs. Research with this focus typically highlights how green innovations improve resource efficiency and reduce negative impacts on the environment, in line with the goals of the SDGs. However, the results of the analysis also reveal gaps in the literature that include limitations of empirical studies and a lack of in-depth regional analysis. This suggests that most research is still concentrated in a specific region or sector, while variations in social, economic, and institutional contexts in different developing countries are not yet fully represented.

The research gap is an indication that the development of the concept of green entrepreneurship requires an expansion of methodological approaches and increased cooperation between regions in order to produce a more comprehensive understanding. This conceptual mapping also confirms that the integration of eco-innovation strategies, circular economy models, and the contribution of MSMEs to the SDGs is still a potential research space in the future. Therefore, this concept map plays an important role in directing the next direction of research, especially in identifying the systematic relationship between green entrepreneurship, sustainable innovation, and the achievement of sustainable development goals in developing countries.

V. CONCLUSIONS

This study offers a systematic and integrative synthesis of the global literature on green entrepreneurship and SME sustainability within the Sustainable Development Goals (SDGs) framework by combining a Systematic Literature Review (SLR) and bibliometric analysis of Scopus-indexed publications from 2016 to 2025. By employing PRISMA-guided screening and advanced bibliometric tools (Bibliometrix and VOSviewer), the study maps the intellectual structure, thematic evolution, and collaborative patterns shaping this emerging research domain.

The findings reveal a clear acceleration of scholarly interest after 2020, positioning green entrepreneurship as a strategic response to sustainability challenges faced by SMEs, particularly in developing economies. Bibliometric and thematic analyses identify green innovation, SME sustainability, sustainable development, and policy–institutional support as the core pillars of the literature. These themes collectively highlight the central role of SMEs as agents of sustainable transformation, linking entrepreneurial behavior at the micro level with broader macro-level SDG outcomes, especially SDGs 8, 9, 12, and 13.

From a theoretical standpoint, this study advances the literature by integrating insights from the Triple Bottom Line (TBL), Resource-Based View (RBV), and Institutional Theory into a unified conceptual framework. The synthesis demonstrates that green entrepreneurship is not merely an environmental strategy, but a multidimensional mechanism through which SMEs can enhance competitiveness, resilience, and long-term sustainability. However, the review also uncovers persistent fragmentation across theoretical lenses and a dominance of context-specific studies, underscoring the need for stronger theoretical integration and comparative empirical validation.

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Methodologically, this research contributes by offering a transparent and replicable SLR–bibliometric framework that can serve as a reference model for future sustainability and entrepreneurship reviews. The combined use of quantitative mapping and qualitative content analysis enables a deeper understanding of both the structural patterns and substantive insights within the literature, thereby strengthening the robustness of the conclusions drawn.

From a policy and practical perspective, the findings emphasize the importance of supportive institutional environments, including green finance mechanisms, regulatory incentives, and capacity-building programs, in accelerating the adoption of green entrepreneurial practices among SMEs. Policymakers should align sustainability policies with SME development strategies, while higher education institutions and business incubators are encouraged to embed green entrepreneurship and sustainability competencies into their curricula and training programs.

Despite its contributions, this study is subject to limitations. The analysis is confined to English-language publications indexed in Scopus, which may exclude relevant regional or non-indexed studies. Additionally, bibliometric methods are inherently limited in capturing contextual nuances and causal relationships. Future research should expand database coverage, employ meta-analytic or longitudinal approaches, and integrate firm-level quantitative evidence to strengthen empirical generalizability.

Building on these insights, future studies are encouraged to explore three priority research avenues: (1) the interaction between digitalization and green entrepreneurship, including the role of green fintech and digital platforms; (2) cross-country comparative analyses to assess institutional heterogeneity and policy effectiveness; and (3) the development of empirical models linking green entrepreneurial activities to measurable SDG performance indicators. Addressing these gaps will enhance the practical relevance and policy impact of green entrepreneurship research.

In conclusion, this study consolidates green entrepreneurship as a critical nexus between innovation, SME sustainability, and sustainable development. By providing an integrated conceptual roadmap and a robust methodological foundation, the research contributes to advancing academic discourse and informing evidence-based policies aimed at fostering a more sustainable and inclusive global economy.

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