GREEN AND SUSTAINABLE ENTREPRENEURIAL INTENTIONS: EXPLORING RESEARCH FROM THE SCOPUS DATABASE THROUGH BIBLIOMETRIC ANALYSIS

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Abstract

Amid escalating environmental pressures, green and sustainable entrepreneurship has gained prominence as a pathway to reconcile growth with the Sustainable Development Goals. Based on the Scopus database, this study employs bibliometric methods to clarify the developmental trends of the topic, "green and sustainable entrepreneurial intentions," drawing on 236 published articles. The results indicate that China leads in terms of the number of publications, followed by Southeast Asian countries such as Malaysia, Indonesia, and India. The educational context is the focus of most studies, which indicate a shift from analyzing entrepreneurial intentions to examining actual entrepreneurial behavior. Co-authorship analysis indicates that research groups have not established strong long-term connections; rather, small and relatively new groups have made substantial contributions to the overall understanding of the field. Literature converges around six main themes: (1) Education and the Development of Sustainable Entrepreneurial Intentions, (2) Green entrepreneurship in educational contexts, (3) Environmental performance and green corporate governance, (4) Green innovation and entrepreneurial intentions, (5) Personal motivation and behavioral perceptions, and (6) Theoretical foundations in green entrepreneurship research. The number of publications has risen sharply since the COVID-19 pandemic, reflecting the increasingly evident link between global crises and sustainable entrepreneurship. This study not only systematizes a comprehensive overview of green and sustainable entrepreneurial intentions but also outlines future research.

Research purpose:

The purpose of this study is to provide a comprehensive overview of green and sustainable entrepreneurial intentions by analyzing publications retrieved from the Scopus database. The study focuses on publication trends, influential countries and authors, collaboration networks, and the impact of the COVID-19 pandemic on scholarly interest in this field.

Research motivation:

Growing concerns about climate change and environmental degradation have highlighted the urgent need for sustainable business practices. Green and sustainable entrepreneurship has therefore emerged as an inevitable trend in the modern economy. This study is motivated by the lack of a systematic overview in this area and aims to synthesize existing knowledge, identify research gaps, and propose directions for future inquiry through bibliometric analysis.

Research design, approach, and method:

This study applies bibliometric analysis to 236 documents (journal articles, conference papers, and book chapters) collected from the Scopus database between 2013 and 2024. The dataset was processed using PRISMA screening and analyzed with VOSviewer software and Excel to map publication trends, co-authorship networks, keyword co-occurrence, and influential sources.

Main findings:

The results reveal two distinct phases in the development of research on green and sustainable entrepreneurial intentions: a limited early stage (2013-2019) followed by rapid growth after 2020, strongly influenced by the COVID-19 pandemic. China has emerged as the leading contributor, while Malaysia, Indonesia, and India also play significant roles. Six major research themes were identified, with education and the younger generation being the most prominent. Research has also shifted from focusing on intentions to examining entrepreneurial behaviors and capacities. Co-authorship networks remain fragmented, though influential scholars such as Makhloufi Lahcene play central roles.

Prestigious journals like Sustainability, Journal of Cleaner Production, and Business Strategy and the Environment serve as key publication outlets.

Practical/managerial implications:

The findings provide insights for policymakers, educators, and entrepreneurs by emphasizing the strategic role of education in fostering green entrepreneurial intentions. They highlight the need for stronger policy support mechanisms, particularly in developing countries, to encourage sustainable entrepreneurship. The rapid increase in publications after the COVID-19 pandemic underscores the relevance of integrating resilience and sustainability into entrepreneurial practices, offering guidance for future business strategies and academic collaboration.

Keywords: Green entrepreneurial orientation, Sustainable business intentions, Bibliometric analysis, Science mapping, COVID-19.

1. INTRODUCTION

has emerged as an inevitable trend in the modern economy. National governments are making concerted efforts to foster entrepreneurial potential as a means of driving economic growth, while simultaneously remaining committed to the pursuit of sustainable development goals (Criado-Gomis et al., 2017). However, the pursuit of sustainable entrepreneurial opportunities is considered a major and long-term challenge for businesses. On the one hand, enterprises are confronted with pressures stemming from a wide range of government regulations (Guo et al., 2020). On the other hand, pursuing a green economic model is becoming a strategic business opportunity that enables firms to enhance their competitive advantage. Green and sustainable entrepreneurial intentions are regarded as a key factor determining the formation and implementation of green entrepreneurial activities in practice.

Sustainable entrepreneurship is defined as "an understanding of how opportunities to bring into existence future goods and services are discovered, created, and exploited, by whom, and with what economic, psychological, social and environmental consequences". This approach integrates environmental impacts into the core definition of entrepreneurship as originally proposed by Venkataraman (Soo Sung & Park, 2018). Meanwhile, green entrepreneurship represents a distinct branch of entrepreneurial activity that focuses on developing and implementing solutions to address environmental challenges, while simultaneously fostering social change in ways that do not harm the ecosystem (Domańska, 2023). The concept of "intention" is employed as an indicator to measure an individual's readiness to become a green entrepreneur (Wei- & Nordin, 2019). Although entrepreneurs pursuing sustainability goals have existed since the nineteenth century, it is only in recent years that entrepreneurship associated with sustainable development has truly emerged as a research topic attracting significant scholarly attention (Criado-Gomis et al., 2017). However, a comprehensive academic overview of the global research network in this field is still lacking. This highlights the need for a bibliometric analysis to systematically synthesize existing findings, identify research gaps, and outline future research directions.

To comprehensively explore studies on green and sustainable entrepreneurial intentions, this article employs bibliometric analysis with the support of VOSviewer software to examine global scholarly works retrieved from the Scopus database. By analyzing indicators such as publication volume, citations, countries, co-authorship, and keyword network mapping, this study identifies prevailing research themes, collaboration patterns among authors, and the impact of academic contributions. This approach provides an in-depth examination of the development of green entrepreneurship, thereby uncovering research gaps and potential avenues for future inquiry. The main research questions include:

RQ1: An overview analysis of the formation and development stages, together with the impact of countries involved in researching the topic of "Green and Sustainable Entrepreneurial Intention"

RQ2: What are the major research trends and themes in the field of green and sustainable entrepreneurial intention? What potential research directions could foster the further development of this field?

RQ3: Assessing the collaboration among authors and the sources of publication that have significantly influenced the development of this field

RQ4: How has the COVID-19 pandemic affected the number of publications and the level of scholarly interest in the topic of green and sustainable entrepreneurial intention?

2. METHODOLOGY

In this research, the bibliometric method is applied to analyze data collected from the Scopus database covering the period 2013–2024. The method has been widely adopted across various scientific fields, including digital collaboration (Nguyen et al., 2023), energy demand forecasting (T. Le et al., 2025), and entrepreneurship (T.-V. Le & Tran, 2021). Bibliometric analysis aims to identify research trends and the structural configuration of knowledge bases in different domains (Zupic & Čater, 2015). In this paper, a meta-bibliometric examination is conducted to synthesize and systematize findings on green entrepreneurial intentions, thereby offering a comprehensive overview of the field's development.

2.1 Search criteria and source identification

The two most well-known scientific databases for bibliometric analysis are Scopus and Web of Science, which researchers frequently choose (Schotten et al., 2017). However, because of its widespread coverage and popularity, the Scopus database is used more frequently. Furthermore, the consistency of the data that Scopus contains is also highly acknowledged.

The data were systematically collected through the stages of identification, screening, eligibility assessment, and synthesis. As the research focuses on green and sustainable entrepreneurial intention, the following keywords were used in the search process: "green entrepreneurial orientation," "green entrepreneurial intention," "green entrepreneurship

orientation," "green entrepreneurship intention," "sustainable entrepreneurial orientation," "sustainable entrepreneurial intention," "sustainable entrepreneurship orientation," and "sustainable entrepreneurship intention." The search syntax was constructed as follows:

(TITLE-ABS-KEY ("green entrepreneurial orientation" OR "green entrepreneurial intention" OR "green entrepreneurship orientation" OR "green entrepreneurship intention") OR TITLE-ABS-KEY ("Sustainable entrepreneurial orientation" OR "Sustainable entrepreneurial intention" OR "Sustainable entrepreneurship orientation" OR "Sustainable entrepreneurship intention")) AND (EXCLUDE (PUBYEAR , 2025)) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "ch") OR LIMIT-TO (DOCTYPE , "cp"))

Bibliometric data (including authors, titles, links, citations, etc.) related to the database used in this study were exported from Scopus into an Excel file. The PRISMA framework was utilized to make sure the screening procedure was transparent and systematic. This method outlines a four-step procedure: identification, screening, eligibility assessment, and inclusion. Specifically, at the identification stage, the keyword-based search initially retrieved 238 documents from the Scopus database, including journal articles, conference papers, and book chapters. During the screening stage, five authors independently reviewed the titles and abstracts of the retrieved documents to assess their relevance to the research questions. At the eligibility stage, the authors discussed and reached consensus in cases where differences in evaluation arose. Finally, 2 documents were excluded, and 236 studies were retained for analysis. This structured four-step procedure is summarized in Figure 1 (PRISMA diagram).

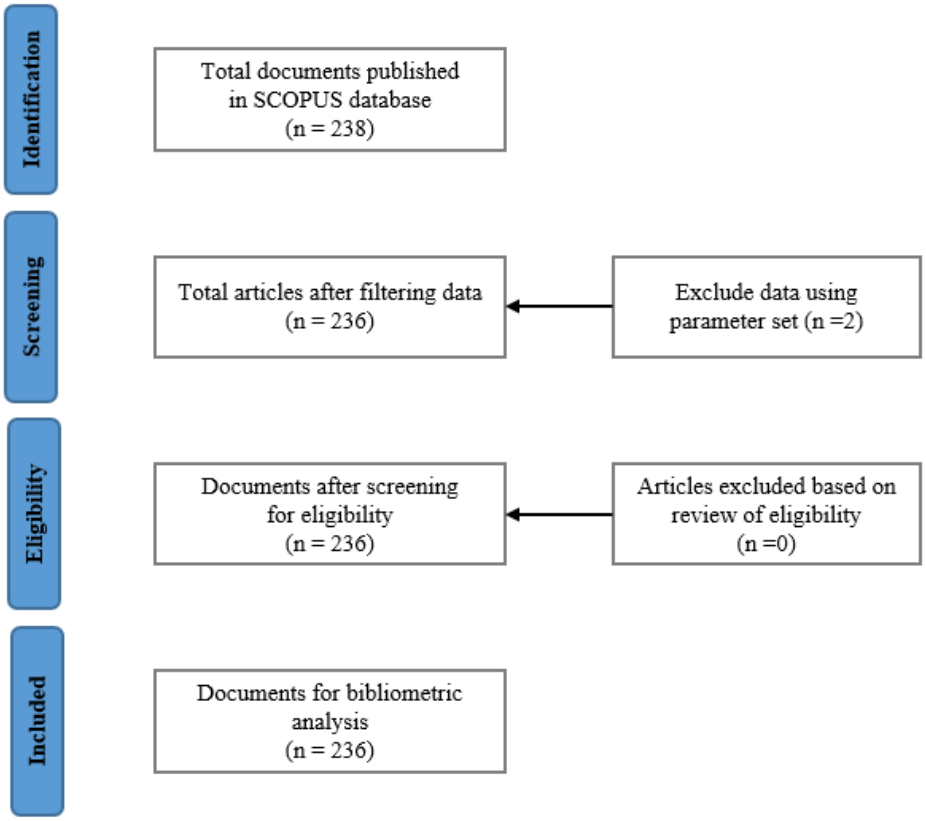


Fig. 1. PRISMA diagram

Source: Authors' synthesis

2.2 Data Analysis

For processing and analysis, bibliometric data from 236 publications on green entrepreneurial intention was extracted from Scopus and saved as an Excel file. Descriptive analysis was conducted using Excel to visualize general characteristics such as the distribution of publications over time, by country, journal, document type, and by citation count. These insights provide an overall assessment of the level of interest, development, and academic impact of the field within the scholarly community.

VOSviewer software - a widely used tool in bibliometric analysis - was employed to conduct in-depth analysis and visualize relationships within the dataset. The software facilitates the creation of science maps that represent networks of co-authorship, co-citation, and keyword co-occurrence.

3. RESULT

This section presents the results of a bibliometric analysis on green entrepreneurial orientation and sustainability, addressing four main research questions. The analysis identified 236 scientific documents published between 2013 and 2024, focusing on sustainable entrepreneurial intention and green entrepreneurship. These documents were authored by 654 scholars across 62 countries and territories, and consist of 225 journal articles, 6 book chapters, and 5 conference papers.

3.1 Analysis of the development stage

The development of research on green entrepreneurial orientation and sustainability is divided into stages, as shown in Figure 2. From left to right, the chart is split into 2 stages:

On stage 1 (2013-2019): Called the initiation phase. Only 17/236 research studies about this subject matter, accounting for 7.59% of the total research. Studies on green and sustainable entrepreneurial intention have not really received much attention; on average, fewer than 3 papers are published per year. 2018 was the year with the highest number of publications, with 8 documents published.

On stage 2 (2020-2024): the acceleration phase, included 219 of 236 research studies, representing 92.41 % of the total number discovered. The slope of the chart from 2020 onwards represents significant increases in research on this topic. Generally, after 2020, scholars pay considerable attention to green and sustainable entrepreneurial orientation. The year with the highest number of articles published in 2024, with 91 papers published.

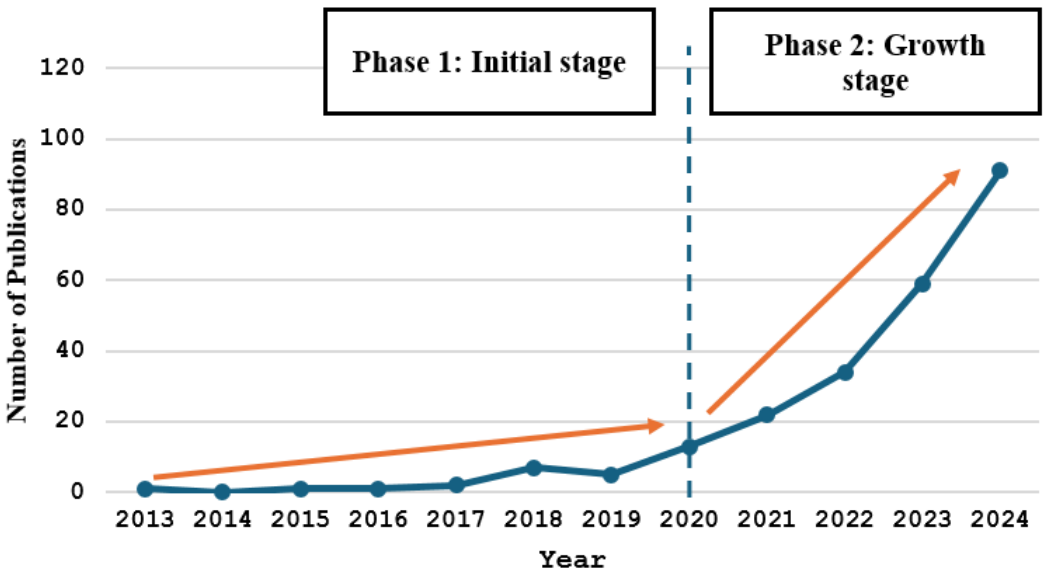


Fig. 2. Growth model of green entrepreneurial intention research in Scopus (2013–2024).

Source: Authors' synthesis

3.2 Analysis of the contributions of countries

Figure 3 presents the publishing productivity of countries over the period from 2013 to 2024.

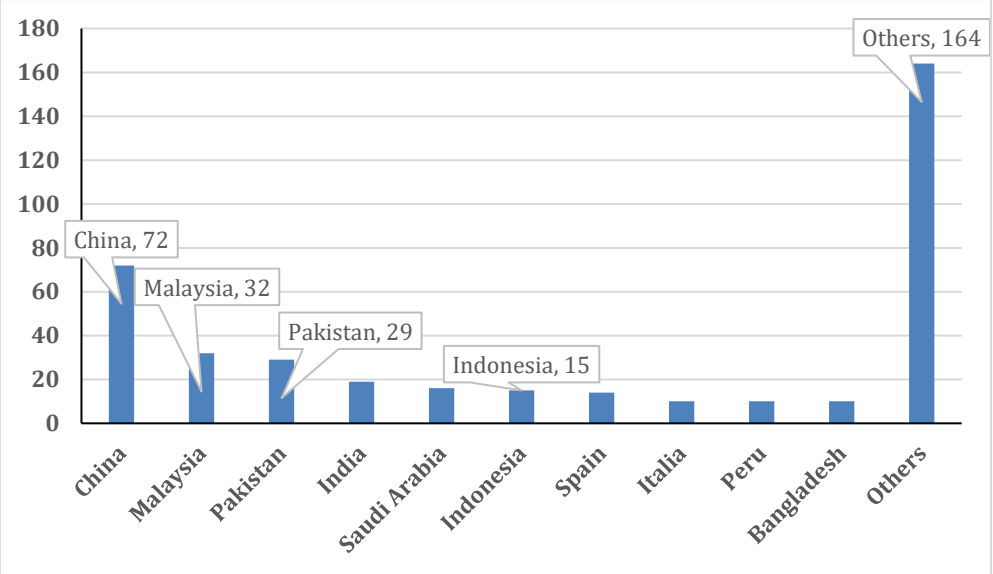


Fig. 3. Geographical distribution of publications on green entrepreneurial intention in Scopus (2013–2024). Source: Authors' compilation

Source: Authors' synthesis

About geography, 236 documents were written by 654 authors from 62 countries. This shows the deep concern of scholars worldwide about green entrepreneurial intentions and sustainability. According to Figure 3, China is a nation engaged in the largest research, with an overwhelming number of remaining countries (71 research, accounting for 30.50% of the total). Subsequently, Malaysia has 32 publications, Pakistan 29, India 19, Saudi Arabia 16, Indonesia 15, Spain 14, Italy 10, Peru 10, and Bangladesh 10. Except that Spain and Italy are 2 developed nations, the remaining 8 countries are emerging countries. This indicates that green and sustainable entrepreneurial intentions have attracted greater attention in developing countries, whereas they remain relatively underexplored in developed countries.

Notably, ASEAN contributes to 47 research (19.91%), with Malaysia and Indonesia being the representative countries. There are 32 papers due to the Malaysian author taking part in, followed by Indonesia with 14 research studies.

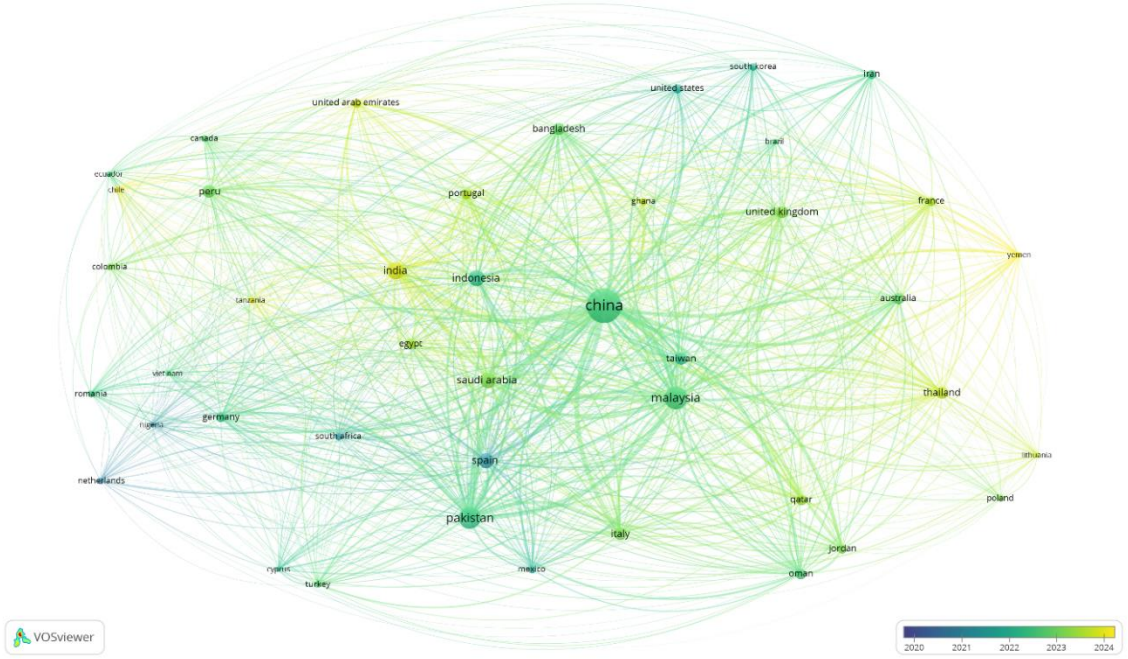


Fig. 4. Co-authorship collaboration network by country over time on green entrepreneurial intention publications in Scopus (2013–2024), including 43 countries/territories with at least two documents

Source: Extracted from VOSviewer

The thickness of the edges connecting different nodes illustrates the co-authorship relationships among scholars from different countries. The thicker the line, the greater the number of documents that are co-published between 2 or more countries.

The dimension of nodes in China is the largest, and in the center of the chart shows that this country plays an essential central role in the author collaboration network. China - Pakistan and China - India have a considerably thicker internode seam, reflecting a close relationship and a large number of articles related to the topic of green and sustainable entrepreneurial intention.

ASEAN countries such as Malaysia and Indonesia, however, do not possess research nodes as large as those of China, they are all located at the center of the network connection, demonstrating contributions and having a major impact on the connection between countries in cooperative research about this subject

Figure 4 demonstrates that majority of countries all countries have engaged in research on green and sustainable entrepreneurial intentions since 2021, with yellow and green shades predominating. In the initial stage, pioneering countries included the Netherlands, Nigeria, Spain, and South Africa, mainly from Europe and Africa. Subsequently, the topic has been widely embraced and rapidly advanced across several Asian nations, such as China, Malaysia, Indonesia, Saudi Arabia, and Pakistan. At present, the number of countries involved in this research continues to increase, with the inclusion of India, the United Arab Emirates, Portugal, Thailand, Tanzania, and Chile, highlighting the ongoing development of this field in Asia and its further expansion to other continents.

In particular, although India is only beginning to appear between 2023 and 2024, it has a relatively large node, positioned near the center of the network and connecting with many other nations.

3.3 Analysis of influential authors

Table 1. Top 10 most influential authors on green entrepreneurial intention (2013–2024)

No	Author	TC	NP	PY_start
1	MAKHLOUFI L	269	6	2020
2	CERVERA-TAULET A	179	4	2017
3	CRIADO-GOMIS A	179	4	2017
4	YASIR N	170	4	2021
5	ALVAREZ-RISCO A	164	6	2021
6	ASAD M	136	4	2022
7	ALEDEINAT M	124	3	2022
8	ALSHEBAMI AS	76	4	2023
9	AFTAB J	44	3	2024
10	AL MARRI SH	32	3	2023

Source: Authors' synthesis

In the Scopus database, a total of 654 authors have published at least one document on green and sustainable entrepreneurial intention. Among them, only 2 authors have produced 6 papers, 6 researchers have published 4 articles each, and 25 authors have contributed 3 studies.

A prominent author in this field is Makhloufi L, who has produced six studies with a total of 269 citations with his first publication in 2020. He is ranked first in Table 2 and is also the author of the second-highest ranked document in Table 2, entitled “Impact of green entrepreneurship orientation on environmental performance: The natural resource-based view and environmental policy perspective.”

Other notable authors include Alshibami Ali Saleh, with four studies and 76 citations since his first publication in 2023; Asad Muzaffar, who has produced four studies with 136 citations since 2022; and Cervera-Taulet Amparo, with four studies and 179 citations since his first publication in 2017.

3.4 Analysis of important works

Table 2. Top 10 most influential publications on green entrepreneurial intention (2013–2024)

No	Paper	Author	Journal	TC	TC per Year	Year
1	Green entrepreneurial orientation for enhancing firm performance: A dynamic capability perspective	JIANG W	Journal of Cleaner Production (Q1)	325	40.63	2018
2	Impact of green entrepreneurship orientation on environmental performance: The natural resource-based view and environmental policy perspective	MAKHLOUFI L	Business Strategy and the Environment (Q1)	158	39.5	2022
3	The impact of green entrepreneurial orientation, market orientation and green supply chain management practices on sustainable firm performance	HABIB MA	Cogent Business and Management (Q2)	157	26.17	2020
4	From green entrepreneurial intentions to green entrepreneurial behaviors: the role of university entrepreneurial support and external institutional support	YI G	International Entrepreneurship and Management Journal (Q1)	147	29.4	2018
5	Sustainable Entrepreneurship Orientation: A Reflection on Status-Quo Research on Factors Facilitating Responsible Managerial Practices	KRAUS S	Sustainability (Switzerland) (Q1)	136	17	2018
6	Green Entrepreneurial Orientation and Green Innovation in Small and Medium-Sized Enterprises (SMEs)	MUANGMEE C	Social Sciences (Q2)	127	25.4	2021
7	Achieving sustainable competitive advantage through green entrepreneurial orientation and market orientation: The role of inter-organizational learning	PRATONO AH	Bottom Line (Q1)	126	18	2019
8	Green Entrepreneurial Orientation and Green Innovation: The Mediating Effect of Supply Chain Learning	GUO Y	SAGE Open (Q1)	123	20.5	2020
9	Factors Affecting Green Entrepreneurship Intentions in Business University Students in COVID-19 Pandemic Times: Case of Ecuador	ALVAREZ-RISCO A	Sustainability (Switzerland) (Q1)	116	23.2	2021
10	Do green entrepreneurial orientation and green knowledge management matter in the pursuit of ambidextrous green innovation: A moderated mediation model	SHEHZAD MU	Journal of Cleaner Production (Q1)	107	35.67	2023

Source: Authors' synthesis

Table 2 presents the top 10 most-cited publications on the topic of green and sustainable entrepreneurial intention. The most highly cited study in the dataset is "Green entrepreneurial orientation for enhancing firm performance: A dynamic capability perspective" by Jiang W (2018), with 325 citations, substantially more than any other article, and an average of 40.63 citations per year. The paper that contributed to clarifying the mechanism of "green entrepreneurship orientation" from the perspective of dynamic capability theory. At the same time, the study highlights the critical role of knowledge

and technology in enhancing sustainable business efficiency, while emphasizing the ways in which Green Entrepreneurial Orientation (GEO) supports firms in strengthening their capabilities and overall performance. The study "Impact of Green Entrepreneurship Orientation on Environmental Performance: The Natural Resource-Based View and Environmental Policy Perspective" by Makhloufi in 2022 is the second most cited work in the dataset, with 158 citations, averaging 39.5 citations per year. This research is grounded in the Natural Resource-Based View (NRBV), which emphasizes green resources as a source of competitive advantage, and the Dynamic Capabilities framework, which explains how firms reconfigure and leverage their capabilities to transform green entrepreneurial intentions into sustainable outcomes.

Research has contributed new and important perspectives on green entrepreneurial intentions. For example, the COVID-19 pandemic in the study "Factors Affecting Green Entrepreneurship Intentions in Business University Students in COVID-19 Pandemic Times: Case of Ecuador" has increased interest in green and sustainable entrepreneurial intentions and spurred research to examine how individual intentions are translated into organizational orientations and business strategies to cope with uncertain contexts.

Moreover, the subjects studied in the above articles are mainly students and small and medium enterprises, which shows that this field is being approached from both academic and practical perspectives.

3.5 Analysis of important published sources

Table 3. Top 10 leading sources on green entrepreneurial intention from 2013 to 2024.

No	Source	TC	NP	AC	PY Start	COPE
1	SUSTAINABILITY (SWITZERLAND)	1437	48	29.94	2017	Q1
2	JOURNAL OF CLEANER PRODUCTION	578	5	115.6	2018	Q1
3	BUSINESS STRATEGY AND THE ENVIRONMENT	311	9	34.56	2022	Q1
4	COGENT BUSINESS AND MANAGEMENT	215	7	30.71	2020	Q2
5	INTERNATIONAL ENTREPRENEURSHIP AND MANAGEMENT JOURNAL	206	3	68.67	2018	Q1
6	FRONTIERS IN PSYCHOLOGY	162	9	18	2019	Q2
7	BOTTOM LINE	136	2	68	2019	Q1
8	CORPORATE SOCIAL RESPONSIBILITY AND ENVIRONMENTAL MANAGEMENT	133	5	26.6	2021	Q1
9	INTERNATIONAL JOURNAL OF MANAGEMENT EDUCATION	96	3	32	2022	Q1
10	ECONOMIC RESEARCH-EKONOMSKA ISTRAZIVANJA	43	3	14.33	2020	Q2

Source: Authors' synthesis

To date, the 10 most influential sources on the topic of green entrepreneurial intention have published 58 documents, accounting for 24.57% of the total. In this context, indicators such as TC (Total Citations), NP (Number of Publications), AC (Average Citations), PY_start (Publication Year Start), and COPE (Citations per Publication per Year) are employed.

The leading sources in this field are high-quality journals, ranked in Q1 or Q2. Among them, the majority are Q1 journals, accounting for 7 out of the 10 sources.

The journal Sustainability (Switzerland) has the highest number of articles, with 48 studies and 1,437 citations, and first published on this topic in 2017.Two of these publications are among the top 10 most cited: "Sustainable Entrepreneurship Orientation: A Reflection on Status-Quo Research on Factors Facilitating Responsible Managerial Practices" and "Factors

Affecting Green Entrepreneurship Intentions in Business University Students in COVID-19 Pandemic Times: Case of Ecuador". However, the average number of citations per article of this source (29.9) is still lower than some other sources.

Two other sources, International Entrepreneurship and Management Journal and Bottom Line, report a relatively high average citation rate of 68 and both ranked in Q1. Business Strategy and the Environment is among the top 10 most influential sources; although it only started publishing on this topic in 2022, it has already accumulated 311 citations and is ranked Q1. Its most notable contribution is the article "Impact of Green Entrepreneurship Orientation on Environmental Performance: The Natural Resource-Based View and Environmental Policy Perspective" (2022), which has received 158 citations and ranks second among the top 10 most influential publications in this field.

3.6 Co-authorship analysis

Each circle represents an author, with the node size reflecting the number of publications, while colors indicate the temporal sequence of contributions. Purple denotes authors with publications in 2020, whereas yellow marks those who joined the field more recently in 2024. The interconnected nodes form clusters, representing collaborative research groups

As shown in Figure 5, the research groups are interconnected, with an average of 3–4 authors per cluster. However, a considerable number of single-author contributions remain, and several groups involve only a small number of authors.

The emergence of numerous lighter-colored nodes indicates a growing trend in the number of scholars involved in this field. Most of these are yellow nodes, representing the year 2024—the most recent point in the dataset. At the same time, some research clusters, such as those led by Dastgeer and Leong, Y.P., show limited interconnections. The cluster associated with Seraj, despite having a relatively large number of contributors, has ceased to remain active since 2020.

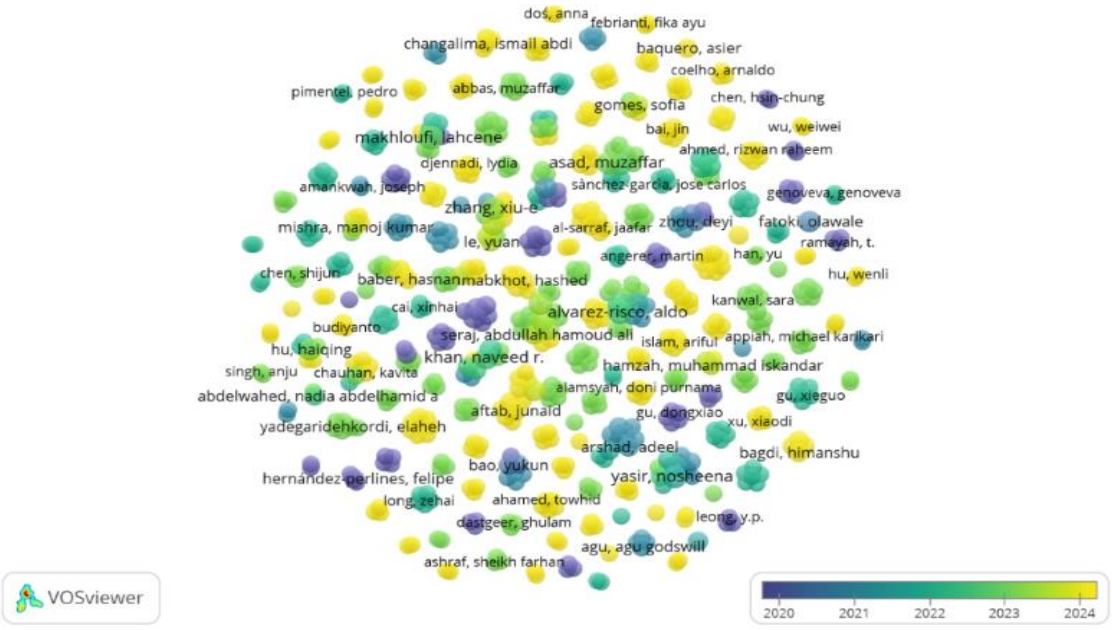


Fig. 5. Co-authorship network of scholars from 2013 to 2024.

Source: Extracted from VOSviewer

Criteria for identifying prominent clusters include their proximity to the network center, the strength of their connections, and their interconnections with other groups. Based on these indicators, several notable author clusters can be identified. For example, the group of Makhloufi L., Djermani, and Meirun has produced the influential work 'Mediation-moderation model of green absorptive capacity and green entrepreneurship orientation for corporate environmental performance'. Their primary research themes focus on green entrepreneurship and big data. Another significant cluster is represented by Alvarez Risco and Del Aguila Arcentalé, whose study 'Factors Affecting Green Entrepreneurship Intentions in Business University Students in COVID-19 Pandemic Times: Case of Ecuador' ranks ninth among the most-cited publications in this field. This article was published in Sustainability, the top-ranked source among the 10 most influential journals.

3.7 Co-keyword analysis

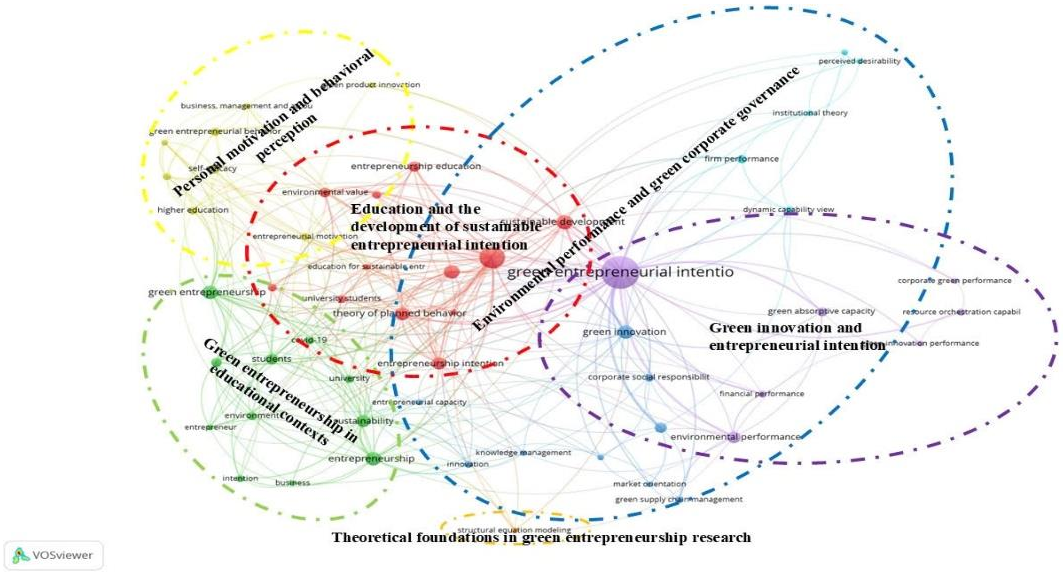


Fig. 6. Science mapping of co-word analysis (minimum of 4 author keywords, displaying 53 keywords)

Source: Extracted from VOSviewer

To explore and capture the key themes and emerging trends in green and sustainable entrepreneurial intention, a keyword and co-word analysis was conducted to identify the main research topics in the literature. In particular, 53 keywords were identified as the most significant and were grouped into six clusters through co-occurrence analysis. These thematic clusters are represented by six colors: red—education and the development of green and sustainable entrepreneurial intention; green—green entrepreneurship in the educational context; blue—environmental performance and green corporate governance; purple—green innovation and entrepreneurial intention; yellow—individual motivation and behavioral perceptions; and orange—theoretical foundations in green entrepreneurship research.

In general, research topics in this field are fairly diverse, with a particular focus on small enterprises and university students. The red and green clusters both highlight the connection between green entrepreneurial intention and education, underscoring the role of younger generations and the educational context as key subjects and settings of investigation.

Notably, in the keyword map, Structural Equation Modeling (SEM) appears as a distinct node (in orange), indicating that it is a widely used analytical tool with significant influence in research on green and sustainable entrepreneurial intention.

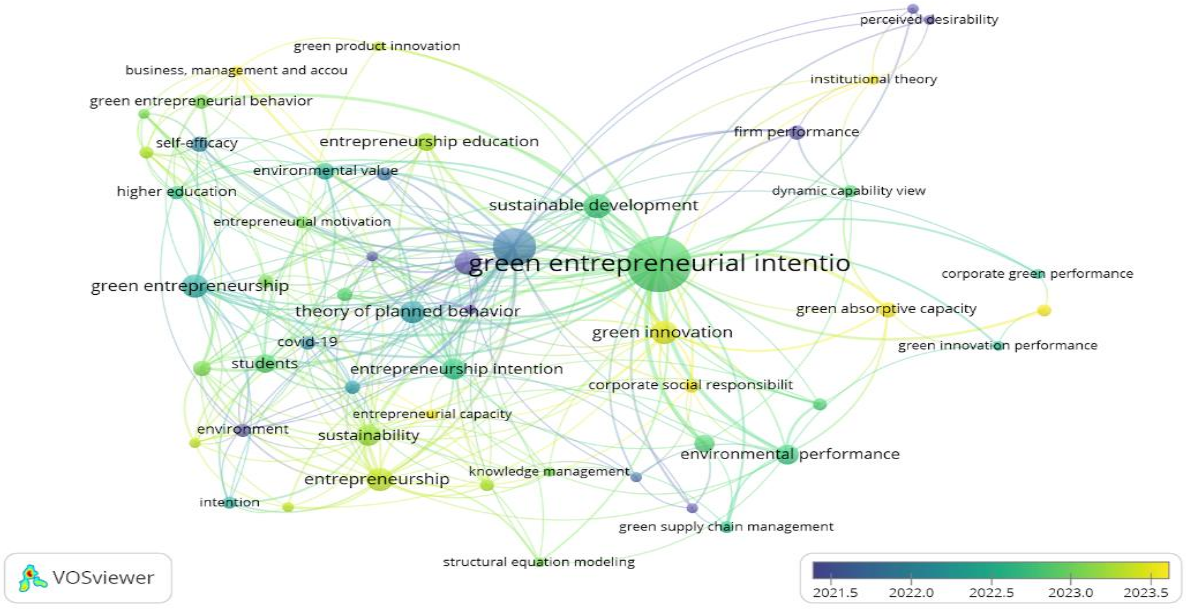


Fig. 7. Science mapping of co-word analysis over time (minimum of 4 author keywords, 53 keywords in total)

Source: Extracted from VOSviewer

Based on the color of the nodes, the development of research topic can be divided into three stages according to keyword evolution:

From mid-2021 to early 2022: research primarily focused on green supply chain management, theoretical foundations such as the Theory of Planned Behavior (TPB), and behavioral factors influencing green entrepreneurial intention, particularly under the impact of the COVID-19 crisis. Prominent keywords in this stage include 'green supply chain management,' 'firm performance,' 'COVID-19,' and 'Theory of Planned Behavior.'

From mid-2022 to early 2023: the research trend shifted toward green entrepreneurship and environmental performance, with higher education began to emerge as a key factor fostering green and sustainable entrepreneurial intentions. Prominent keywords during this period include 'green entrepreneurial intention,' 'green entrepreneurship,' 'higher education,' 'students,' and 'environmental performance.'

From 2023 onwards: The theme shifts to practical application in enterprises and green innovation. Focus on enterprise performance and innovation absorption capacity. Typical keywords are "green innovation", "green absorptive capacity", "green entrepreneurial behavior", "green product innovation", "entrepreneurial capacity", "knowledge management",...

The keywords 'student' (12 occurrences), 'university' (6 occurrences), and 'entrepreneurship education' have emerged only in recent years and are closely linked to the network of terms such as 'green entrepreneurial intention,' 'entrepreneurship,' and 'entrepreneurial motivation.

The keyword 'Covid-19,' represented in dark blue, indicates an early emergence (around 2021). This keyword is strongly connected to central terms and demonstrates significant influence. Specifically, its network of associations includes 'entrepreneurship intention,' 'green entrepreneurship intention,' 'theory of planned behavior,' 'green entrepreneurship,' 'students,' 'environment,' and 'sustainability.

The keyword "Theory of Planned Behavior (TPB)" is positioned at the center of the map, connected with keywords such as "green entrepreneurial intention," "entrepreneurship education," and "entrepreneurial motivation." This confirms that TPB is the most widely applied theoretical foundation in research on green entrepreneurial intentions, playing a crucial role in explaining entrepreneurial behavior through factors such as attitude, subjective norms, and perceived behavioral control. In addition, there are other theories, such as the institutional theory and dynamic capabilities, which have been employed in previous studies on green and sustainable entrepreneurial intentions.

In addition, the map lacks keywords associated with government support policies for green and sustainable entrepreneurship.

4. DISCUSSION

This section presents the main discussions of the study based on four key research questions. Although the concept of green and sustainable entrepreneurial intention has emerged and evolved for more than a decade, no study to date has offered a comprehensive overview of this field. In order to fill this gap, a bibliometric analysis was conducted using the Scopus database for the period 2013–2024, with the support of VOSviewer and Excel. Specifically, the study explores four main aspects: (1) the temporal growth rate and geographical distribution of scientific publications on this topic; (2) key research trends and themes, along with potential future research directions; (3) the collaboration networks among authors and the influence of publication sources; and (4) the role of COVID-19 in shaping the development of this field.

RQ1: An overview analysis of the formation and development stages, together with the impact of countries involved in researching the topic of "Green and Sustainable Entrepreneurial Intention"

The findings indicate that although the first publications on this topic appeared in 2013 in journals indexed in Scopus, the number of articles only began to show significant growth from 2020 onward. During the initial phase (2013–2019), the publication rate was relatively slow, less than three articles per year on average. The topic had yet to attract significant scholarly attention. This period was characterized by fragmented studies, focusing mainly on conceptual foundations (Tan et al., 2013), identifying influencing factors (Jiang et al., 2018), and verifying specific contexts (Criado-Gomis et al., 2018). Since 2020, the field has grown rapidly with a sharp increase in the number of publications. In just five years (2020–2024), 219 articles were published, accounting for more than 92% of the total documents. This reflects changes in the research strategies of approaches and priorities. The global context shaped by the COVID-19 pandemic highlighted the importance of sustainable business models and sustainable entrepreneurial mindsets, thereby intensifying interest in green entrepreneurship, green innovation, and sustainable development. The final year of the dataset also recorded the highest number of publications, suggesting that research on green entrepreneurial intention and sustainable development will continue to expand in the future.

Studies on green and sustainable entrepreneurial intention first appeared in some European and African countries, before spreading strongly across multiple continents. To date, however, the field has developed most vigorously in Asia. China leads in terms of research output, producing twice as many publications as Malaysia, the second-ranked country. Beyond quantity, China also serves as a central hub in the international collaboration network, underscoring its broad influence in the field. Following China are Malaysia, Pakistan, India, and Saudi Arabia, all of which have made substantial contributions to the overall development of this domain. The most frequent co-publishing pairs are China–India and China–Pakistan, reflecting the strong academic influence of these countries within the global network. The topic has attracted significant attention from developing nations, whereas developed countries have yet to demonstrate prominent contributions. At the regional level, Southeast Asia has made relatively large contributions to research on green and sustainable entrepreneurial intention. Countries such as Malaysia and Indonesia, though not central nodes like China, play an crucial bridging role in regional research networks. This highlights the growing engagement and contributions of developing countries, particularly in Southeast Asia. The strong growth in this region can be attributed to economic expansion that fosters investments in research and innovation, particularly in entrepreneurship and sustainable development (Development, 2024). Another possible explanation lies in the shifting global research landscape, characterized by increased South–South collaboration (Global South), rather than relying solely on Western countries (Leydesdorff et al., 2013). Notably, India, despite being a relatively recent entrant, has rapidly achieved a substantial number of publications, ranking fourth among contributing countries. This reflects the country's significant potential to further advance and expand research in this area.

RQ2: What are the major research trends and themes in the field of green and sustainable entrepreneurial intention? What potential research directions could foster the further development of this field?

The analysis identified six major themes in this research area: (1) education and the development of sustainable entrepreneurial intention, (2) green entrepreneurship in educational contexts, (3) environmental performance and green corporate governance, (4) green innovation and entrepreneurial intention, (5) personal motivation and behavioral perceptions, and (6) theoretical foundations in green entrepreneurship research.

Two of these six clusters are directly related to education, indicating that education for green and sustainable entrepreneurial intention has become a prominent focus among scholars. This underscores the importance placed on fostering sustainable business mindsets among younger generations. Keywords such as "green entrepreneurial intention" and "green entrepreneurship," together with the highly co-occurring terms "student," "university," and "entrepreneurship education," highlight the close link between higher education and green entrepreneurial intention. This emphasis illustrates the academic focus on nurturing sustainable entrepreneurial awareness and skills among future human capital (Alvarez-risco et al., 2021). Moreover, the research concentration on university contexts shows that the field is being shaped early within educational processes, supporting the argument that green and sustainable entrepreneurial intention is a strategic business trend set for future growth.

In recent years, research has shifted notably from focusing solely on entrepreneurial intention toward examining actual entrepreneurial behavior and capacity (Yi, 2020). Current studies are no longer limited to identifying who intends to start a business but rather explore who takes action and how ideas are realized (Ip, 2024). This trend is reflected in the rising use of keywords such as "green entrepreneurial behavior," "entrepreneurial capacity," and "green product innovation." Rather than focusing only on willingness, research now emphasizes capabilities such as learning ability, green absorptive capacity, green innovation, and knowledge management (Guo et al., 2020). This shift helps narrow the gap between intention and action in green and sustainable entrepreneurship, thereby enhancing practical effectiveness and advancing sustainable development amid globalization and the green transition.

To strengthen the theoretical foundation, this study highlights several pieces of background research and research methods that have guided prior research on green and sustainable entrepreneurial intentions. The Theory of Planned Behavior (TPB) has been widely employed to explain how attitudes (Yasir et al., 2023) , social norms, and perceived behavioral control influence entrepreneurial intention, while the Natural Resource-Based View (NRBV) and Dynamic Capabilities framework emphasize how firms transform green orientation into sustainable outcomes (Ameer & Khan, 2023) (Al-Swidi et al., 2024). Moreover, institutional theory underlines the role of regulatory and policy environments in shaping green entrepreneurial behavior. In terms of methodology, most prior studies have relied on survey-based approaches, structural equation modeling (SEM), and case studies, focusing mainly on students and small enterprises. By contrast, this research adopts a bibliometric perspective to provide a macro-level synthesis, complementing existing micro-level empirical studies.

Importantly, the study not only synthesizes current research trends but also identifies new research gaps. A clear absence of keywords related to policy support for green and sustainable entrepreneurial intention was observed. This suggests a potential research avenue for future scholars, particularly in connecting entrepreneurial behaviors with government policies. Such a focus would be highly relevant, encouraging entrepreneurs and enterprises to invest in green and sustainable ventures within the context of climate change and the global pursuit of sustainable development goals.

RQ3: Assessing the collaboration among authors and the sources of publication that have significantly influenced the development of this field

The co-authorship analysis reveals that research groups typically consist of three to four authors, indicating a growing trend of small-group collaborations. A considerable number of independent researchers remain, suggesting a fragmented landscape with limited integration into larger collaborative networks. The number of scholars working in this area has increased steadily, peaking in 2024—the most recent year in the dataset—implying that the topic will likely continue to attract scholarly attention. Nevertheless, some groups, such as those led by Dastgeer and Leong Y.P., have tended to work more independently, showing weaker connections within the broader academic network. Similarly, larger groups like Seraj's have ceased publishing after 2020.

Among individual contributors, Makhloufi Lahcene stands out as the most influential scholar, leading in both publication count (six papers) and citations (269). A particularly notable work is "Impact of Green Entrepreneurship Orientation on Environmental Performance: The Natural Resource-Based View and Environmental Policy Perspective," which has received 158 citations, ranking second among the most influential publications in the field. His research focuses on topics such as Big Data Analytics Capabilities (BDAC), Green Absorptive Capacity (GAC), Green Entrepreneurship Orientation (GEO), and Environmental Performance (EP). Over time, his research trajectory has shifted toward themes related to sustainability, organizational capabilities, and technology.

Prominent collaborations include Makhloufi L. – Djermani – Meirun, with their influential work "Mediation-moderation model of green absorptive capacity and green entrepreneurship orientation for corporate environmental performance." This study explores how GAC and GEO influence EP through mediating and moderating mechanisms, situating their research within the nexus of green entrepreneurship and big data. Another noteworthy collaboration is Alvarez Risco – Del Aguila Arcentalé with the article "Factors affecting green entrepreneurship intentions in business university students in COVID-19 pandemic times: Case of Ecuador." This work highlights the relationship between green entrepreneurial intention and the global pandemic crisis, ranking ninth in terms of citation counts and published in Sustainability, the leading journal in this field.

The analysis further reveals that the ten most influential publication sources collectively contributed 58 documents, nearly one-quarter of the total publications. Most of these journals belong to Q1 or Q2 categories, underscoring their academic prestige and recognition. Sustainability (Switzerland) leads with 48 articles and 1,437 citations, reflecting its central role in promoting research on this subject. Interestingly, while this journal has the highest volume of publications, its average citations per paper are lower than those of other journals, suggesting that its influence stems more from quantity than the average impact of individual studies. Conversely, the Journal of Cleaner Production, with only five articles, achieved 578 citations, reflecting high-quality contributions. A standout article, "Green entrepreneurial orientation for enhancing firm performance: A dynamic capability perspective," accounts for more than half of these citations. Similarly, Business Strategy and the Environment, though only entering the field in 2022, quickly gained prominence, securing 311 citations and Q1 ranking.

These findings highlight that academic influence cannot be judged solely by aggregate journal metrics but should also consider the individual impact of specific articles. Highly cited works help shape research trajectories, while others may remain supplementary. Noteworthy journals also include the International Entrepreneurship and Management Journal and Bottom Line, which achieved high average citations per article. Overall, influential publication sources serve not only as outlets but also as academic hubs, fostering the development of a sustainable research community. This emphasizes the strategic importance of publication venues for researchers in this field

RQ4: How has the COVID-19 pandemic affected the number of publications and the level of scholarly interest in the topic of green and sustainable entrepreneurial intention?

Within four years after 2020, research output in this domain increased significantly. The crisis caused by the COVID-19 pandemic severely disrupted human life, creating economic and social upheaval (Bărbulescu et al., 2021). In this context, entrepreneurship was viewed as a vital driver in advancing sustainable development goals and mitigating the pandemic's adverse impacts (Wang et al., 2021). One representative study is "Factors affecting green entrepreneurship intentions in business university students in COVID-19 pandemic times: Case of Ecuador," which highlights how green entrepreneurship became a viable alternative as traditional business models were disrupted. The study shows how educational support, national policies, and academic environments influenced students' entrepreneurial self-efficacy, thereby fostering green and sustainable entrepreneurial intentions. This article not only demonstrates the indirect influence of COVID-19 on entrepreneurial motivation but also illustrates the academic community's growing interest in sustainable business models in the post-pandemic era. As of now, the article has been cited 160 times, ranking ninth among the most cited works in this field, underscoring its broad scholarly impact.

Moreover, the keyword "COVID-19" appeared prominently at the beginning of the acceleration phase (2021). It showed strong linkages with central keywords, reflecting the deep integration of the pandemic into the thematic structure of this field. Its timing, position, and connections within the network illustrate that COVID-19 served not only as a global health

crisis but also as a catalyst for expanding research on green and sustainable entrepreneurial intention—both in terms of publication volume and scholarly influence. The pandemic was not only a health crisis but also acted as a trigger for ethical, ecological, and community-oriented entrepreneurial behaviors (Wang et al., 2021).

The findings highlight a clear surge in both publication volume and scholarly attention during and after the pandemic. This contrasts with earlier studies that primarily emphasized individual-level factors without considering broader contexts such as public health crises or societal disruptions. The pandemic emerged as a critical contextual factor shaping academic orientations, while simultaneously emphasizing the ecological values and social responsibilities that constitute the core pillars of green entrepreneurship. This serves as compelling evidence of how socio-environmental factors can shape both research behavior and the practical development of green and sustainable entrepreneurship.

5. CONCLUSION

Based on a bibliometric analysis of 236 papers from the Scopus database, this report provides a comprehensive overview of the development of green and sustainable entrepreneurship intentions from 2013 to 2024. It examines the research and development process, the contributions of different countries, research trends, the degree of academic collaboration, the role of influential publication sources, and the impact of the COVID-19 pandemic on publication output and scholarly interest. The results reveal that the field has experienced two distinct phases of development: an initial stage characterized by a limited number of studies, followed by a growth stage marked by a sharp increase in publication output after 2020. China emerges as the leading contributor, occupying a central position within the international collaboration network. Notably, Southeast Asian countries such as Malaysia and Indonesia have also made substantial contributions, while India, despite its relatively recent entry into the field, has rapidly achieved remarkable progress.

A co-keyword analysis identified six major research themes: green entrepreneurship education, green and sustainable entrepreneurship in academic contexts, environmental performance and green corporate governance, green innovation, individual motivation, and theoretical foundations. Among these, education and the younger generation emerged as the most prominent focus, underscoring the pivotal role of training in fostering sustainable entrepreneurial intentions. Furthermore, the literature demonstrates a notable shift from analyzing intentions to entrepreneurial behavior and capabilities, emphasizing practical aspects such as green absorptive capacity, green product innovation, and knowledge management.

According to co-authorship analysis, the collaborative structure is growing, but it is still mostly small group. Makhloufi Lahcene is a highly influential scholar who plays a central role in the network, while other groups tend to operate in isolation. Prestigious academic journals such as Sustainability, Journal of Cleaner Production, and Business Strategy and the Environment are important sources of publications, both promoting knowledge diffusion and shaping core research topics.

Finally, this study reveals that the COVID-19 pandemic has strongly promoted the development of research on green entrepreneurship intentions. This trend shows the increasingly close connection between environmental issues and entrepreneurial motivation in the context of global uncertainty.

Researchers can use the above results to explore other potential research directions. The limited number of articles related to policies supporting sustainable and green entrepreneurship development may open up new research gaps for this topic. In addition, the examination of sustainable entrepreneurship intentions within educational environments remains a focal area that requires further expansion. The rapid increase in works after the COVID-19 pandemic raises the need for further research on the long-term impact of the global crisis on sustainable entrepreneurship behavior. Moreover, new scholars can rely on these results to identify suitable collaboration objects and research topics and choose more effective publication platforms in their academic development strategies.

Limitations of the study: While this study provides a comprehensive and systematic overview of green and sustainable entrepreneurship intentions, several limitations should be noted. First, there are limitations related to the data sources. All 236 publications were retrieved exclusively from the Scopus database. Although Scopus is one of the largest and most reputable scientific databases, relying on a single source may lead to the omission of important studies indexed in other databases such as Web of Science, Dimensions, or Google Scholar, thereby affecting the comprehensiveness and representativeness of the analysis. Second, there are limitations concerning keyword scope and retrieval criteria. Because only a small number of articles were published between 2013 and 2019, keywords from this period were not sufficiently represented in the temporal keyword analysis. Finally, the bibliometric approach employed is primarily descriptive and quantitative. While network diagrams and keyword co-occurrence maps capture surface-level relationships, they do not provide deeper theoretical insights or contextual interpretations of individual studies.

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