EXPLORING GREEN ENTREPRENEURSHIP RESEARCH AMONG UNIVERSITY STUDENTS: A BIBLIOMETRIC PERSPECTIVE ON TRENDS AND FUTURE DIRECTIONS

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Abstract:

Background: Awareness of sustainability and environmentally friendly practices was increasing in various sectors, including the business world, which had led to the development of green entrepreneurship as a sustainable economic strategy. Despite the growing interest of students in green entrepreneurship, there was still a gap in the literature regarding research trends in this area, which called for a systematic approach to understanding the pattern and direction of its development.
Purpose: This study aims to analyze and map the development of green entrepreneurship research among university students through a bibliometric approach. It highlights publication trends, patterns of academic collaboration, and the main topics that dominate the scientific literature.
Design/methodology/approach: This study employs a bibliometric analysis of 30 selected publications from the Scopus database to examine the development of green entrepreneurship research among university students. Using VOSviewer and R Studio (Bibliometrix) to map citation networks, research trends, and thematic clusters, the study adopts the theoretical framework of entrepreneurial intention and sustainability to provide a structured understanding of this emerging field.
Findings/Result: This study confirms that university students are pivotal in shaping green entrepreneurship through sustainability-oriented education, psychological readiness, and institutional support. These findings highlight the need for universities and policymakers to integrate sustainability values into curricula and provide targeted programs that accelerate students' transition into green entrepreneurial practices.
Conclusion: This study concludes that green entrepreneurship among university students is increasingly shaped by sustainability awareness, psychological drivers, and the integration of entrepreneurship education with environmental values. Universities function as central incubators by embedding sustainability into curricula, fostering experiential learning, and facilitating collaborations with industry to enhance students' readiness for green ventures. For policymakers, these findings emphasize the urgency of providing supportive regulations, accessible green technologies, and cross-sectoral partnerships to accelerate sustainable entrepreneurship as a pathway to inclusive and environmentally responsible economic growth.
Originality/value (State of the art): This study highlights the novelty of applying these principles to entrepreneurship education, expanding the traditional intensity model by integrating environmental awareness and moral responsibility as reinforcing mechanisms. By positioning universities as central incubators connecting education, policy, and industry, this study advances understanding of how academic ecosystems can foster green student entrepreneurial orientation more effectively than previous approaches focused solely on economic concepts.

Keyword: green entrepreneurship, university students, bibliometric, academic collaboration, sustainability

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INTRODUCTION

Awareness of sustainability and environmentally friendly practices was increasing in various sectors, including the business world (Estébanez & Martín, 2025). Environmental issues, including climate change, overexploitation of natural resources, and increased industrial waste, had led to the concept of green entrepreneurship (Al Shammre et al. 2023). This concept emphasized integrating sustainability principles in business activities, from product development and production processes to social and environmental impacts (Tekala et al. 2024). Empirical bibliometric evidence indicated a significant increase in green entrepreneurship publications since 2020, particularly in areas such as green technology, policy frameworks, and educational initiatives, underscoring its growing academic and practical relevance (Manoharan et al. 2025). In the modern era, green entrepreneurship was not only an economic necessity but also a strategy that contributed to the sustainability of the global ecosystem. Moreover, green entrepreneurship had demonstrated measurable economic, social, and environmental benefits compared to conventional new ventures which highlighting their tangible positive impact on sustainable development (Manoharan et al. 2025).

In addition, green entrepreneurship differed from conventional entrepreneurship. Conventional entrepreneurship generally emphasized economic profit as its main goal. Meanwhile, green entrepreneurship fundamentally viewed economic profit as a means to achieve broader environmental and social goals, not as an end in itself (Li et al. 2022). Green entrepreneurs also aimed to capitalize on emerging market opportunities by promoting ecological sustainability and aligning business operations with environmental conservation and community well-being. This orientation involved a strategic combination of ecology-oriented innovation and market responsiveness. Green entrepreneurs not only prioritized long-term environmental outcomes but also actively leveraged the growth of the green market to ensure long-term business sustainability.

In the academic world, green entrepreneurship was getting increasing attention, especially among students as the next generation and future economic drivers (Anghel & Anghel, 2022). Universities in various countries were integrating sustainability values into their curricula to shape an entrepreneurial mindset that was more concerned about the environment. With this increased awareness, many students were interested in developing sustainability-based businesses through business incubation programs, entrepreneurship competitions, or environmental impact-oriented social projects. However, despite these promising developments, the current literature revealed a specific gap: there was a limited empirical evaluation of the real-world impact of green entrepreneurship programs on university students, specifically whether curricula or initiatives actually translated into sustained entrepreneurial behavior or measurable environmental outcomes (Prasetio et al. 2025).

Although the trend of green entrepreneurship among university students showed positive developments, challenges remained. One of the main obstacles was the lack of understanding of the pattern and direction of research development in this field. Many studies focused on theoretical aspects or specific case studies, but no comprehensive approach a systematic overview of how green entrepreneurship was developing among university students. This created gaps in the scientific literature that might hinder the utilization of the potential of green entrepreneurship in higher education. In addition, geographical and institutional factors also influenced the development of green entrepreneurship in higher education. Environmental regulations, educational policies, and entrepreneurial culture in each country played different roles in encouraging or hindering the growth of green entrepreneurship (Hua et al. 2024). Some countries with strict environmental policies tended to have students who were more motivated to create sustainability-based businesses than countries with more relaxed regulations. Therefore, systematically mapping research trends in different parts of the world was becoming increasingly important.

In the context of this research, a bibliometric approach was one method that could provide deeper insights into the green entrepreneurship research landscape (Dote-Pardo et al. 2025). Bibliometric analysis allowed researchers to understand publication trends, citation patterns, and academic collaborations formed around this topic (Baidya & Saha, 2024). As such, this study would identify the extent to which the topic of green entrepreneurship was growing in the academic environment and how external factors influenced its growth.

Several previous studies have highlighted the role of universities in shaping the green entrepreneurial mindset among students. The study by Asad et al. (2025) revealed that universities play a crucial role in promoting sustainable entrepreneurial intentions among students, addressing both unemployment and environmental degradation. In addition, research from Papp-Váry et al. (2023) show that the importance of universities in fostering a green entrepreneurial mindset among students, particularly Generation Z. It highlights the responsibility of educational institutions to create an enabling environment that encourages young individuals to become conscious, green-minded entrepreneurs. By integrating sustainability into their curricula and promoting green innovative technologies, universities can significantly influence students' motivations and concerns regarding entrepreneurship, ultimately leading to the establishment of more environmentally-conscious and sustainable businesses and startups. However, few studies still systematically explore how green entrepreneurship research trends evolve over time and how geographical and institutional factors influence their spread.

The novelty of this research lies in the bibliometric approach that will be used to assess the pattern of green entrepreneurship research among students. By identifying publication trends, patterns of academic collaboration, and key topics that dominate the scientific literature, this study will contribute to a broader understanding of the dynamics of research in this field. In addition, this study will help to uncover research gaps that remain under-discussed, thus providing a foundation for future research. Furthermore, this approach allows for explicit links to broader sustainability frameworks, such as the concept of Sustainable Entrepreneurship, which combines economic, social, and environmental goals (triple bottom line), thereby explaining how green entrepreneurship among students contributes to the achievement of Sustainable Development Goals (SDGs), particularly SDGs 8, 11, and 12 (Sreenivasan & Suresh, 2023).

To address the issues at hand, this study will adopt bibliometric analysis to provide a systematic mapping of the development of literature on green entrepreneurship among university students. This approach will enable the exploration of relevant scholarly publications in various academic databases. By processing the data using software such as VOSviewer and R Studio, this research will uncover the main trends in green entrepreneurship research among university students and see how academic networks are developing in this field.

In addition, this study will analyze how external factors such as environmental policies, institutional support, and cultural differences contribute to variations in green entrepreneurship research across regions. By understanding these patterns, this research can provide greater insight into how universities can actively encourage green entrepreneurship among students.

This research is expected to find patterns and directions for developing green entrepreneurship research among students and recommendations for academics and policymakers in supporting the development of a sustainability-based entrepreneurial ecosystem. Thus, this research contributes to the development of academic literature and can serve as a reference for universities in designing more effective green entrepreneurship education strategies.

METHODS

This study uses a bibliometric approach to analyze the development of research on green entrepreneurship among university students. Bibliometric analysis is a quantitative method used to evaluate large volumes of academic publications (Dote-Pardo et al. 2025). Identifying patterns, trends, and networks in the literature provide deep insight into the development of a field of study. A bibliometric approach is chosen over a systematic review because it allows for macro-level mapping of structural dynamics, such as collaboration networks, conceptual clusters, and publication trends, in large datasets that are impractical to analyze through in-depth qualitative synthesis. Researchers can efficiently grasp the entire research landscape without having to examine each paper in detail, as is often the limitation in systematic literature reviews that involve in-depth analysis of a small number of studies (Öztürk et al. 2024).

The data used in this study are retrieved from the Scopus database, which is widely recognized as one of the most comprehensive and credible sources for peer-reviewed publications and citation records. Scopus is selected due to its broad disciplinary coverage, rigorous indexing standards, and significant role in international academic research. By utilizing Scopus,

the study ensures both the reliability and validity of the dataset, providing a robust foundation for bibliometric mapping and subsequent analysis.

The data collection process in this study did not apply a publication time limit, allowing for a broad exploration of trends in green entrepreneurship research without being restricted to a specific period. This approach ensured a comprehensive overview of the evolution of the topic over time. The literature search was carried out systematically using a defined search string and a rigorous selection process to minimize research bias.

The search string used was "Green Entrepreneurship" AND "University Student", which initially produced 75 articles from the database. In the subsequent stage, the keywords, abstracts, and full content of these articles were carefully examined to determine their relevance to the scope of green entrepreneurship among university students. Through this refinement process, only 30 articles were retained for further analysis.

The final dataset consisted of 29 journal articles and 1 book chapter. The selection criteria were based on topic suitability, relevance to the research objectives, and the contribution of each study to the development of green entrepreneurship literature. This systematic approach ensured that only publications with direct relevance and high quality were included in the analysis.

In this study, data analysis was conducted using VOSviewer and R Studio, two widely used software in bibliometric studies. VOSviewer was used to visualize the network relationships among university students between authors, journals, and keywords in green entrepreneurship research. With this software, patterns of collaboration among researchers, journal distribution, and major themes in research could be identified through network maps and cluster analysis. VOSviewer's ability to map citation relationships and the emergence of research topics enabled in-depth exploration of the intellectual structure of the field. In addition, R Studio with the Bibliometrix package was used to perform quantitative analysis of bibliometric data exported in BibTeX format from Scopus.

The software allowed the calculation of research performance metrics, such as the number of publications, citation impact, and author productivity, and the analysis of institutions contributing to the study of green entrepreneurship. With this approach, the research could identify key trends and growth patterns of the literature in this field. The combination of VOSviewer and R Studio ensured a more comprehensive, accurate, and replicable analysis, providing a solid basis for understanding the development and future direction of green entrepreneurship research among university students.

This study aims to explore the trends and future directions of green entrepreneurship research among university students using a bibliometric approach. This study is based on the importance of the role of students as agents of change in supporting sustainable development. A research framework is developed to show the linkages between the global context, research gaps, and the contribution of higher education institutions.

The Figure 1 illustrates the conceptual flow of the research. It starts from the global context of sustainability and green entrepreneurship that drives the development of green entrepreneurship in higher education. Students are seen as agents of change who drive transformation towards a sustainable future, but there is still a gap in scientific studies related to their role. This gap is the basis for using a bibliometric approach to map the trends and contributions of existing research. The results provide an overview of the direction of research development and the strategic role of universities, which is then used as a basis for developing practical implications and future research directions.

RESULTS

Annual Publication

Analyzing the annual publication trend is important to understand how research on green entrepreneurship among university students has developed over time. The number of publications reflects not only the level of interest from the academic community but also the growing importance of sustainability and entrepreneurship in higher education. By looking at the yearly distribution, it becomes possible to see when the field experienced growth, stability, or decline. This provides a clearer view of how attention to green entrepreneurship research has increased in recent years. This level of bibliometric scrutiny is well-supported in the literature. For example, a bibliometric analysis in

higher education reveals a rising annual growth rate in sustainability performance following the introduction of the Sustainable Development Goals (SDGs), indicating increased scholarly engagement with sustainable themes in academia (Umar et al. 2024). Similarly, studies on sustainable entrepreneurship have reported a steady increase in both publications and citations, particularly in the last couple of years, validating the observation that this domain is gaining traction among researchers (Plaha & Sharma, 2024). Moreover, a bibliometric exploration into green entrepreneurship reveals that publication numbers surges, with a notable peak around 2022, demonstrating growing academic attention to green entrepreneurship as a critical field. The trend of annual publications is shown in Figure 2.

The annual publication trend on green entrepreneurship among university students shows a clear increase after a period of stagnation from 2017 to 2020, with significant growth beginning in 2021 and peaking in 2023 before stabilizing at a relatively high level from 2024 to 2025. This pattern suggests that research on this topic has shifted to a more established academic focus. This increase is closely linked to the growing influence of the Sustainable Development Goals (SDGs) in higher education and the recognition of students as key actors in fostering sustainable enterprise (Ávila et al. 2017). Studies also highlight that the integration of entrepreneurship education into university curricula has encouraged both academics and institutions to devote greater attention to this area (Secundo et al. 2020). Therefore, the increasing publication trend reflects not only academic interest but also broader societal and policy recognition of green entrepreneurship as a crucial component of sustainable development.

Countries with the Most Publications

Identifying the countries with the highest number of publications in green entrepreneurship research among university students highlights where academic and policy efforts converge to advance sustainability and green innovation. This focus not only reveals regions prioritizing such research but also reflects how national policies, cultural values, and commitments to sustainability are integrated into higher education. This analysis aligns with the Sustainable Development Goals (SDGs), specifically SDG 4 (Quality Education), SDG 8 (Decent Work and Economic Growth), and SDG 12 (Responsible Consumption and Production), which underscore the importance of education and entrepreneurship for sustainable economic growth. Thus, examining publication trends by country provides early insights into their influence on the development of academic literature, shaping educational policies, and driving innovation in green entrepreneurship. Figure 3 illustrates the distribution of publications by country.

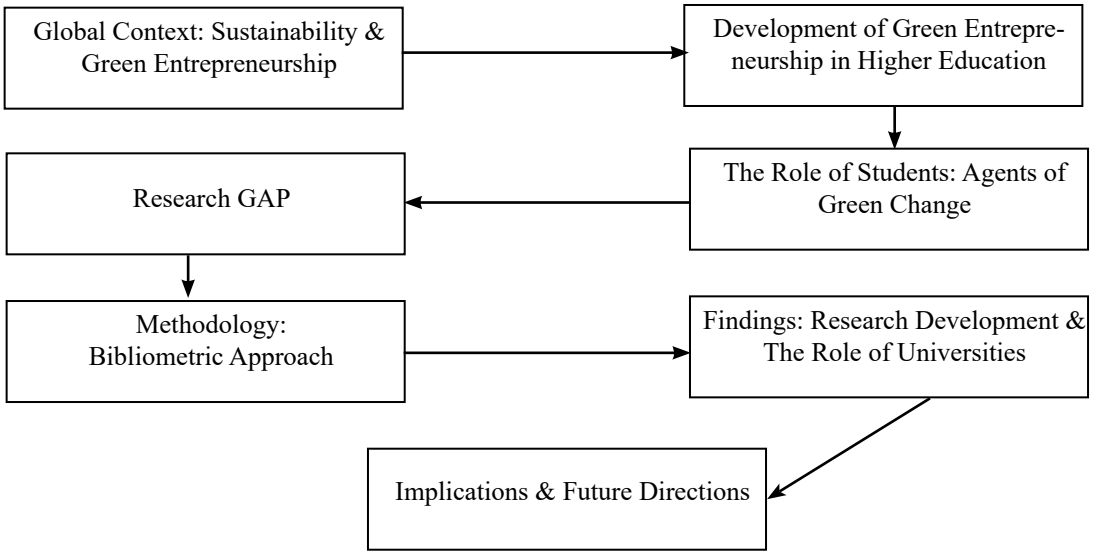

Figure 1. Research framework

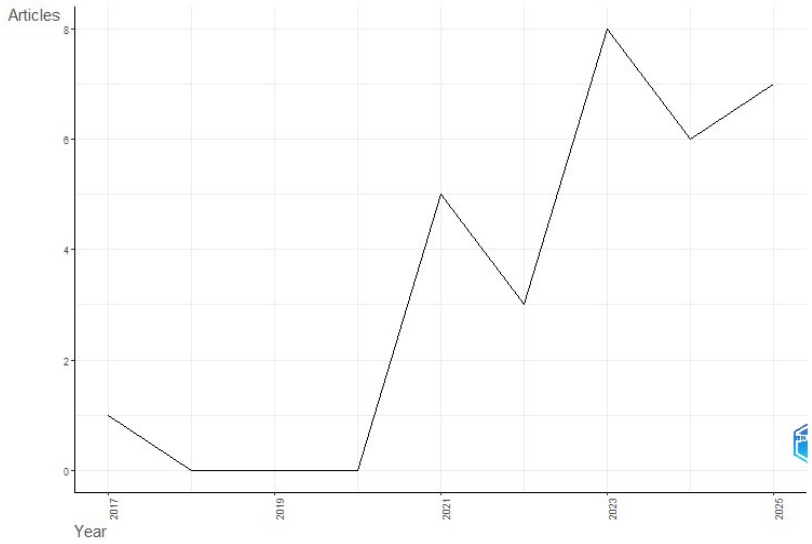

Figure 2. Trend of annual publications

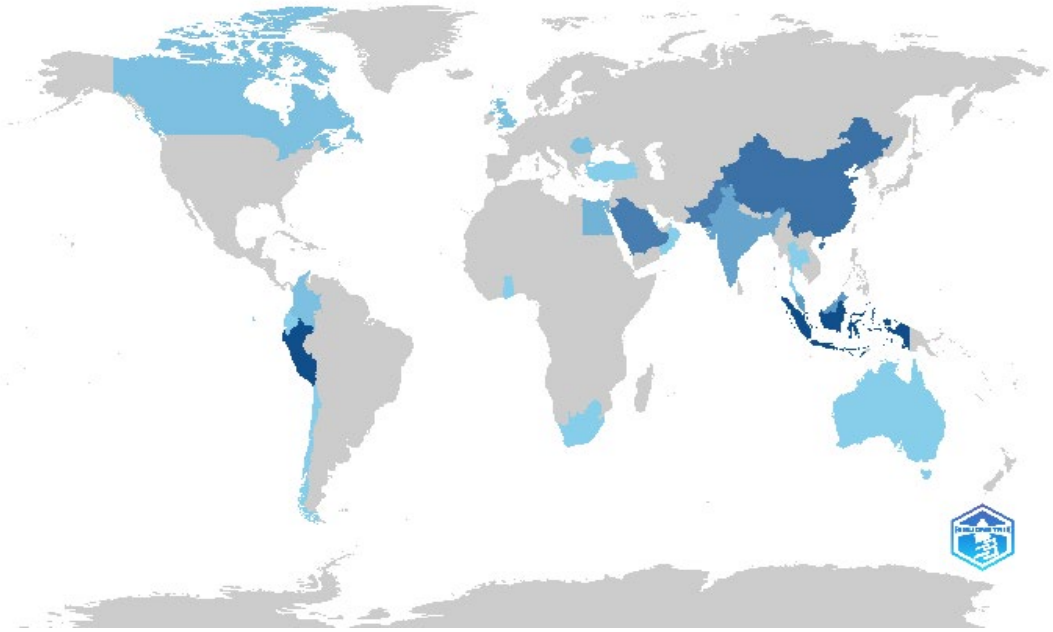

Figure 3. Countries with the most publications

The analysis results show that Indonesia and Peru occupy the highest positions, with 11 publications each, followed by China (8), Pakistan and Saudi Arabia (7 each), Malaysia (5), Bangladesh (4), and India (4). This pattern is consistent with the findings of other studies, which show the strong contribution of Asian countries to the field of entrepreneurship and innovation among university students (Nam & Thi, 2024). Meanwhile, global literature, such as the study by Patnaik & Subudhi (2025), identifies the UK, China, and Germany as the most active countries in general in green entrepreneurship research, which implies a difference in focus between the student and student context. In addition, Patnaik & Subudhi (2025) also emphasized the urgency of Asian contributions, as Germany, the UK, and China ranked at the top in general scientific production, strengthening China's position in the global research spectrum.

The differences between this study's results (mainly from Indonesia and Peru) and those of global studies reflect a narrower research focus on students and green entrepreneurship. These findings suggest an opportunity to examine local factors, such as educational policy, university support, and entrepreneurial culture that foster academic contributions. For example, a cross-

cultural study in Indonesia and Malaysia by Mawardi et al. (2025) highlight the importance of university and government support in turning green entrepreneurship intentions into action among students.

Keyword Analysis

Keyword analysis in bibliometric studies helps reveal the thematic focus of a research field. It also uncovers the conceptual evolution and relationships between topics. By mapping the frequency and relevance of keywords in publications, researchers can identify key topics and research areas that are most relevant to their field. This process shows the main directions of scientific development. It provides valuable insights for developing future research agendas and evaluating the relevance of topics to policy objectives, such as the SDGs.

Keyword analysis in the discussion chapter is crucial because it directly links bibliometric findings to actionable recommendations for educators, policymakers, and green entrepreneurs. It empirically reveals publication patterns, clarifies whether the literature centers on theory, policy, or application, and highlights the most common research topics. This explicit connection enhances the practical relevance of the discussion. Figure 4 presents an overview of the most relevant keywords.

Figure 4 shows that the keyword "entrepreneur" has the highest frequency (7), followed by "student" (6), then "green economy," "perception," and "sustainability" (each with 4 occurrences). This finding indicates that research on green entrepreneurship among students does not only emphasize the entrepreneurial aspect itself but also views students as key actors in developing awareness and perceptions of the green economy and sustainability. This pattern aligns with the findings of Anghel & Anghel (2022), who emphasized that students are important agents of change in the development of green entrepreneurship in the future.

Other keywords such as "education," "university sector," "business development," and "educational development" emphasize the role of higher education in shaping green entrepreneurial intentions and skills. A study by Ali et al. (2023) found that entrepreneurship education that integrates participation significantly increases green entrepreneurial intentions among students. Meanwhile, research by Fanea-Ivanovici & Baber (2022) emphasized that universities that implement sustainable practices in their curricula and operations can be a crucial determinant in the emergence of a new generation of green entrepreneurs.

Keyword Relationships and Future Research Agenda

A discussion of keyword relationships and a future research Agenda is crucial in bibliometric studies, as it provides a broader understanding of the patterns of interconnectedness between key concepts in research. Through keyword relationship analysis, researchers can identify established research areas, interrelationships between topics, and opportunities for developing new themes that are relevant to both academic and practical needs. Thus, this discussion not only presents a map of existing research but also helps formulate a more strategic and sustainable direction for future research. An overview of keyword relationships is shown in Figure 5.

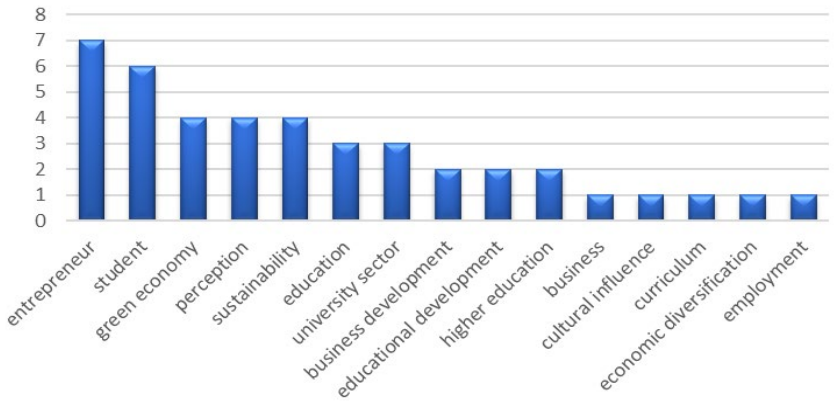

Figure 4. Keyword analysis

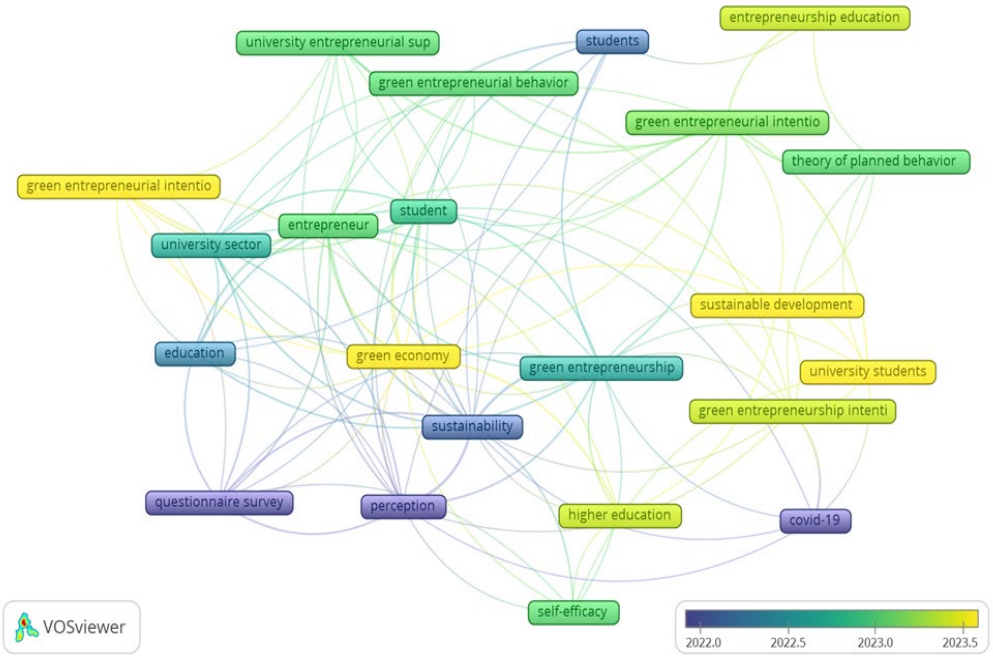

Figure 5. Keyword relationships on topic

Figure 5 displays the interconnectedness of keywords that form the main clusters in research on green entrepreneurship among college students. Keywords such as green entrepreneurship, green entrepreneurial intentions, sustainability, entrepreneurship education, and students occupy central positions and are closely interconnected. This suggests that green entrepreneurial intentions and entrepreneurship education are key links between higher education and global issues.

International literature analysis reveals a consistent pattern, where research on green entrepreneurial intentions among college students is dominated by studies that place the Theory of Planned Behavior (TPB) as the primary framework, while entrepreneurship education, self-efficacy, and university support emerge as important determinants mediating green entrepreneurial intentions and behavior. These findings confirm that green entrepreneurial intentions are influenced by attitudes, subjective norms, and perceived behavioral control (TPB components), which are strengthened by educational interventions and institutional support (Prabowo et al. 2022).

Next, Table 1 classifies the research themes in green entrepreneurship among university students by grouping related keywords into different clusters, which provides an organized overview of the main issues in the field.

Entrepreneurship: The Foundation for Building a Green Entrepreneurial Orientation

Entrepreneurship is the initial foundation that determines the direction of green entrepreneurship development among students. Studies on entrepreneurship education show that learning experiences in building a business, the courage to take risks, and an understanding of business strategies are important foundations that enable students to be directed towards green entrepreneurship practices. Nabi et al. (2017) in their systematic review emphasized that entrepreneurship education in higher education contributes to increasing students' entrepreneurial intentions but have not fully emphasized sustainability aspects. This aligns with bibliometric results that show entrepreneurship remains a dominant keyword, preceding the emergence of green entrepreneurship (Prasetio et al. 2025). Thus, the foundation of entrepreneurship needs to be enriched with sustainability values so that students focus not only on economic benefits, but also on social and environmental impacts.

Green Entrepreneurship: A Key Pillar in Promoting a Green Economy Among Students

Green entrepreneurship has emerged as a key pillar emphasizing the importance of students' contributions to the green economy. A study by Gast et al. (2017)

showed that green entrepreneurship encompasses three main dimensions: economic value creation, social value, and ecological value. In the context of university students, the study confirmed that green entrepreneurial intentions are influenced not only by business opportunities but also by awareness of the global environmental crisis. Bibliometric results indicate that green entrepreneurial intention and green entrepreneurial behavior are frequently employed to explain how students choose to establish green businesses. This demonstrates a transition from simply creating a business to integrating sustainability values into business strategies.

University Context: The Role of Higher Education Institutions as Green Entrepreneurship Incubators

Universities play a crucial role as incubators that foster green entrepreneurial intentions and behaviors among students. Mawardi et al. (2025) demonstrated that university support in the form of curriculum, business incubation facilities, and green entrepreneurship programs significantly influence students' readiness to start a sustainability-oriented business. Bibliometric results also indicate that keywords such as "higher education" and "university entrepreneurial support" are strongly linked to green entrepreneurship. If universities can provide a supportive entrepreneurial ecosystem, students are more likely to develop innovative ideas that impact the green economy. In the future, universities can become research centers and accelerators for the creation of young green entrepreneurs**.**

Table 1. Categories and keywords

Cluster	Category	Definition	Keywords	Occurrences	Total Link Strength
1	Entrepreneurship	The study of entrepreneurial activity in the context of venture creation, business development, and desire strategies at the individual level.	Entrepreneurs	7	32
			Entrepreneurship Education	3	4
			Education	3	16
2	Green Entrepreneurship	A study that highlights green entrepreneurial intentions and behavior and their contribution to the green economy.	Green entrepreneurship	8	26
			Green Entrepreneurial Intention	3	20
			Green Entrepreneurial Behavior	3	11
			Green Economy	4	21
3	Sustainability & Development	The role of sustainability and sustainable development as drivers of green entrepreneurial values, perceptions and orientations.	Sustainability	7	31
			Sustainable Development	3	8
			Perception	4	22
4	University Context	The role of higher education institutions in shaping students' green entrepreneurial intentions and behavior.	University Sector	3	20
			Higher Education	3	8
			University Entrepreneurial Support	3	11
			Student	6	28
5	Psychological & Behavioral Factors	Psychological factors and theoretical models explaining the formation of intentions and transition to green entrepreneurial behavior.	Self-Efficacy	2	5
			Theory of Planned Behavior	3	21

Psychological & Behavioral Factors: Psychological Dynamics in the Formation of Green Entrepreneurial Intentions

Psychological and behavioral factors are important determinants of students' transition to green entrepreneurship. Liñán & Fayolle (2015) emphasized in their literature review that theories of entrepreneurial intention, such as the Theory of Planned Behavior and the concept of self-efficacy, are highly relevant to understanding students' decisions to enter the business world. In a green context, psychological factors are strengthened by environmental awareness, thus encouraging students to feel morally responsible for sustainability issues. Bibliometric results indicate that this factor is still less explored than other categories, opening up opportunities for further research that explores students' intrinsic motivations in developing green businesses.

Managerial Implications

The managerial implications of this study highlight the need for universities, policymakers, and entrepreneurship program managers to integrate sustainability values into entrepreneurship education, provide supportive ecosystems such as incubators and mentoring, and strengthen collaboration with industry and government. By embedding ecological and social responsibility into curricula and offering experiential learning that enhances self-efficacy and environmental awareness, students can be guided to develop sustainable business models. This approach ensures that green entrepreneurship education not only fosters economic benefits but also contributes to social welfare and environmental sustainability, preparing students to play a pivotal role in advancing the green economy.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

This study reveals that green entrepreneurship among university students is growing as a response to sustainability awareness and emerging as a new academic and practical agenda that integrates entrepreneurship education, sustainability studies, and psychological-behavioral perspectives. Unlike prior works that predominantly treated entrepreneurship as an economic phenomenon (Nabi et al. 2017), this research highlights the novelty of embedding sustainability principles into entrepreneurial education as a foundation for shaping students' green entrepreneurial orientation. By synthesizing bibliometric evidence, the study confirms that entrepreneurship, sustainability, and psychological factors are interconnected in fostering students' intentions to create environmentally oriented ventures. These findings contribute theoretically by extending entrepreneurial intention models into a green context, demonstrating that environmental awareness and moral responsibility act as reinforcing mechanisms beyond traditional predictors such as self-efficacy and planned behavior. This research challenges existing literature that often separates business education from sustainability discourses and positions universities as central incubators for green innovation.

From a practical perspective, this study underscores the crucial role universities and policymakers play in transforming students into agents of sustainable change. Experiential learning through green startup competitions, sustainable ecological climates, and partnerships with green industries provides not only the skills but also the mindset necessary for future green entrepreneurs. This aligns with previous research findings (Gast et al. 2017), which showed that a supportive ecosystem in higher education can strengthen students' readiness for green entrepreneurship. For policymakers, these findings highlight the need to strengthen access to green resources and technologies, implement supportive policies, and foster academia-industry-government collaboration to accelerate the adoption of sustainable business practices. By strategically integrating these efforts, green entrepreneurship can develop into a driver of inclusive, innovative, and environmentally friendly economic growth, while positioning students as key contributors to achieving global sustainable development goals.

Recommendations

Based on the study results, it is recommended that universities strengthen their role as incubators of green entrepreneurship by integrating sustainability-oriented curricula, developing business incubation facilities, and fostering collaborations with green industries. Policymakers should also design targeted policies that incentivize students to pursue green businesses, such as tax benefits, financial support schemes, and streamlined regulatory frameworks for sustainable startups. Such interventions will not only enhance

students' entrepreneurial readiness but also align academic environments with national strategies for sustainable development.

Furthermore, future research is encouraged to examine the influence of government policies more deeply, particularly how subsidies, environmental regulations, and funding mechanisms shape students' entrepreneurial intentions and actions. Cross-border collaborations should also be prioritized to capture global perspectives on green entrepreneurship, allowing comparative insights into how different institutional and cultural contexts affect students' engagement with sustainability-driven businesses. By addressing these dimensions, this study provides not only theoretical contributions but also concrete directions for building a globally connected and policy-supported ecosystem of green entrepreneurship among university students.

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REFERENCES

Al Shammre, A. S., Alshebami, A. S., Ali Seraj, A. H., Elshaer, I. A., & Al Marri, S. H. (2023). Unleashing environmental performance: The impact of green entrepreneurial motivation on small enterprises. Frontiers in Environmental Science, 11(April), 1–12. https://doi.org/10.3389/fenvs.2023.1176804

Anghel, G. A., & Anghel, M. A. (2022). Green Entrepreneurship among Students—Social and Behavioral Motivation. Sustainability (Switzerland), 14(14), 1–19. https://doi.org/10.3390/su14148730

Asad, M., Fryan, L. H. Al, & Shomo, M. I. (2025). Sustainable Entrepreneurial Intention Among University Students: Synergetic Moderation of Entrepreneurial Fear and Use of Artificial Intelligence in Teaching. Sustainability (Switzerland), 17(1), 1–21. https://doi.org/10.3390/su17010290

Ávila, L. V., Leal Filho, W., Brandli, L., Macgregor, C. J., Molthan-Hill, P., Özuyar, P. G., & Moreira, R. M. (2017). Barriers to innovation and sustainability at universities around the world. Journal of Cleaner Production, 164, 1268–1278. https://doi.org/10.1016/j.jclepro.2017.07.025

Baidya, A., & Saha, A. K. (2024). Exploring the research trends in climate change and sustainable development: A bibliometric study. Cleaner Engineering and Technology, 18(100720), 1–14. https://doi.org/10.1016/j.clet.2023.100720

Dote-Pardo, J., Ortiz-Cea, V., Peña-Acuña, V., Severino-González, P., Contreras-Henríquez, J. M., & Ramírez-Molina, R. I. (2025). Innovative Entrepreneurship and Sustainability: A Bibliometric Analysis in Emerging Countries. Sustainability (Switzerland), 17(2), 1–28. https://doi.org/10.3390/su17020658

Estébanez, R. P., & Martín, F. J. S. (2025). Business Sustainability and Its Effect on Performance Measures: A Comprehensive Analysis. Sustainability (Switzerland), 17(1), 1–15. https://doi.org/10.3390/su17010297

Fanea-Ivanovici, M., & Baber, H. (2022). Sustainability at Universities as a Determinant of Entrepreneurship for Sustainability. Sustainability (Switzerland), 14(1), 1–13. https://doi.org/10.3390/su14010454

Gast, J., Gundolf, K., & Cesinger, B. (2017). Doing business in a green way: A systematic review of the ecological sustainability entrepreneurship literature and future research directions. Journal of Cleaner Production, 147, 44–56. https://doi.org/10.1016/ j.jclepro.2017.01.065

Hua, W., Liu, C., & Li, C. (2024). Environmental Regulation, Government-Business Relations, and Corporate Green Innovation: Evidence from Low-Carbon City Pilot Policy. Sustainability (Switzerland), 16(22), 1–23. https://doi.org/10.3390/ su16229949

Li, W., Sun, Y., & Gao, Y. (2022). Relationship between green entrepreneurship orientation, integration of opportunity and resource capacities and sustainable competitive advantage. Frontiers in Psychology, 13(12), 1–14. https://doi.org/10.3389/ fpsyg.2022.1068734

Liñán, F., & Fayolle, A. (2015). A systematic literature review on entrepreneurial intentions: citation, thematic analyses, and research agenda. International Entrepreneurship and Management Journal, 11(4), 907–933. https://doi.org/10.1007/s11365-015-0356-5

Manoharan, A. A., Rangaswamy, G., Muthukkannu, G., Sabapathi, S., Anandharaman, K., & N., A. A. T. (2025). Green Entrepreneurship for Sustainability Business: A Bibliometric Analysis. Journal of Lifestyle and SDGs Review, 5(2), 1–17. https://doi.org/10.47172/2965-730x.sdgsreview.v5.n02.pe03204

Mawardi, M. K., Noor, A. Y. M., Edityastono, L., 'Atikah Zulkiffli, S. N., & Mashahadi, F. (2025). Green entrepreneurship in the era of sustainability: the relationship between intent, institutional support, and student behavior. Cogent Business and Management, 12(1), 1–20. https://doi.org/10.1080/23311975.2025.2460625

Nabi, G., LiñáN, F., Fayolle, A., Krueger, N., & Walmsley, A. (2017). The impact of entrepreneurship education in higher education: A systematic review and research agenda. Academy of Management Learning and Education, 16(2), 277–299. https://doi.org/10.5465/amle.2015.0026

Nam, H. N., & Thi, T. M. (2024). Entrepreneurial Intention and Innovation Among Students: a Bibliometric Analysis 2014–2024. Problems and Perspectives in Management, 22(4), 635–648. https://doi.org/10.21511/ppm.22(4).2024.48

Öztürk, O., Kocaman, R., & Kanbach, D. K. (2024). How to design bibliometric research: an overview and a framework proposal. Review of Managerial Science, 18(11), 3333–3361. https://doi.org/10.1007/s11846-024-00738-0

Papp-Váry, Á., Pacsi, D., & Szabó, Z. (2023). Sustainable Aspects of Startups among Generation Z—Motivations and Uncertainties among Students in Higher Educations. Sustainability (Switzerland), 15(21), 1–22. https://doi.org/10.3390/su152115676

Patnaik, S. R., & Subudhi, R. N. (2025). Mapping Green Entrepreneurship: A Comprehensive Bibliometric Analysis. In Innovative Synergies: Business, Agriculture, Technology and Resource Management for Sustainable Development (1st ed., p. 9). Routledge. https://doi.org/https://doi.org/10.4324/9781003650041

Plaha, N., & Sharma, P. (2024). Measuring The Ascending Trend For Sustainable Entrepreneurship : A Bibliometric Analysis. Gadjah Mada International Journal of Business, 26(3), 260–284. https://doi.org/10.22146/gamaijb.80883

Prabowo, H., Ikhsan, R. B., & Yuniarty, Y. (2022). Drivers of Green Entrepreneurial Intention: Why Does Sustainability Awareness Matter Among University Students? Frontiers in Psychology, 13(3), 1–17. https://doi.org/10.3389/fpsyg.2022.873140

Prasetio, B., Supardi, E., Kurniawati, S., Mulyadi, H., Waspada, I., & Istikomah, N. (2025). Bibliometric Analysis of Green Entrepreneurship Research in Higher Education : Trends and Future Research Directions. Journal of Business and Management Review, 6(3), 235–257. https://doi.org/10.47153/jbmr.v6i3.1565

Secundo, G., Ndou, V., Vecchio, P. Del, & De Pascale, G. (2020). Sustainable development, intellectual capital and technology policies: A structured literature review and future research agenda. Technological Forecasting and Social Change, 153(1), 1–21. https://doi.org/10.1016/j.techfore.2020.119917

Sreenivasan, A., & Suresh, M. (2023). Exploring the contribution of sustainable entrepreneurship toward sustainable development goals: A bibliometric analysis. Green Technologies and Sustainability, 1(3), 1–11. https://doi.org/10.1016/j.grets.2023.100038

Tekala, K., Baradarani, S., Alzubi, A., & Berberoğlu, A. (2024). Green Entrepreneurship for Business Sustainability: Do Environmental Dynamism and Green Structural Capital Matter? Sustainability (Switzerland), 16(13), 1–24. https://doi.org/10.3390/su16135291

Umar, S. B., Ahmad, J., Bukhori, M. A. B. M., Mohd Ali, K. A., & Wan Hussain, W. M. H. (2024). A decade in review: bibliometric analysis of sustainable performance trends in higher education institutes. Frontiers in Education, 9. https://doi.org/ 10.3389/feduc.2024.1433525