



Global Research Trends in Green Entrepreneurial Orientation and Environmental Orientation: A Bibliometric Review Based on the Natural Resource-Based View

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Abstract

Background: The increasing environmental challenges and sustainability pressures have significantly transformed the way firms formulate their competitive strategies. In response to these global changes, green entrepreneurial orientation and environmental orientation have emerged as critical organizational capabilities that enable businesses to balance economic performance with societal and environmental responsibilities. Despite the growing body of research in this area, existing studies remain fragmented and lack an integrated understanding of the intellectual structure and development trajectory of this research field.

Objective: This study aims to map the global research landscape of green entrepreneurial orientation and environmental orientation through a comprehensive bibliometric analysis grounded in the Natural Resource-Based View (NRBV).

Methods: Using publications retrieved from the Semantic Scholar database from 2010 to 2025, bibliometric techniques were employed to analyze publication trends, influential authors and journals, collaborative networks, and thematic evolution using VOSviewer software.

Results: The findings reveal rapid growth of research interest, with dominant themes focusing on green innovation, sustainable competitive advantage, and business performance. Network, overlay, and density visualizations indicate strong intellectual linkages between entrepreneurial orientation, environmental strategy, and firm-level outcomes, reflecting a recent shift towards innovation-driven sustainability.

Conclusion: This study provides an integrated overview of sustainability-oriented strategic orientations and their role in supporting business resilience, offering implications for managers, policymakers, and researchers aligned with sustainable development goals.

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INTRODUCTION

In recent years, growing environmental challenges and increasing stakeholder awareness have encouraged firms to integrate sustainability considerations into their strategic orientation. Organizations are no longer evaluated solely based on financial performance but also on their ability to respond to environmental and social expectations. As a result, sustainability-oriented strategies have become an important research focus within strategic management and entrepreneurship literature.

Within this context, environmental orientation reflects a firm's commitment to incorporating ecological considerations into managerial decision-making and organizational practices. Firms demonstrating strong environmental orientation tend to proactively adopt environmentally responsible initiatives, which may enhance long-term competitiveness. At the

same time, entrepreneurial orientation has evolved toward a more sustainability-driven perspective, commonly referred to as green entrepreneurial orientation, emphasizing innovation, proactiveness, and opportunity recognition aligned with environmental objectives.

The increasing intersection between entrepreneurship and sustainability has generated a rapidly expanding body of academic literature (Bag et al., 2020). However, despite significant research growth, the intellectual structure and thematic evolution of studies linking environmental orientation and green entrepreneurial orientation remain fragmented. Previous studies have primarily focused on empirical relationships between sustainability practices and firm performance, while a comprehensive mapping of research development within this domain remains limited.

Therefore, this study aims to systematically map the development of research on environmental orientation and green entrepreneurial orientation using a bibliometric approach. By identifying dominant themes, research clusters, and emerging trends, this study provides a clearer understanding of how sustainability-oriented strategic capabilities have evolved within management and entrepreneurship research.

Parallel to the advancement of environmental management research, studies in entrepreneurship and strategic management have increasingly emphasized the importance of Entrepreneurial Orientation (EO) in shaping firm behavior and strategic decision-making. EO reflects organizational tendencies toward innovativeness, risk-taking, and proactiveness, which influence how firms recognize opportunities, allocate resources, and respond to dynamic market and environmental conditions (Bigné Alcañiz et al., 2010; Covin & Slevin, 1989; Masurel, 2007; Zwetsloot & Van Marrewijk, 2004). Rather than representing isolated managerial actions, these dimensions describe a strategic posture that guides organizational adaptation and competitiveness.

Building upon this perspective, Green Entrepreneurial Orientation (GEO) expands the traditional EO framework by incorporating environmental sustainability considerations into entrepreneurial processes. GEO emphasizes innovation and opportunity exploitation that align with ecological responsibility, encouraging firms to integrate sustainability principles into their operational and strategic activities. From an environmental management standpoint, GEO influences how organizations develop, implement, and evaluate sustainability initiatives across business functions, thereby linking entrepreneurial behavior with environmental performance objectives.

The relationship between EO, GEO, and organizational outcomes can be theoretically explained through the Resource-Based View (RBV), which argues that sustained competitive advantage arises from valuable, rare, and difficult-to-imitate organizational resources and capabilities (Nitzl et al., 2016; Wernerfelt, 1984; Zahra & Covin, 1995). Extending this logic, the Natural Resource-Based View (NRBV) highlights the strategic importance of environmentally oriented capabilities in achieving long-term performance. The NRBV suggests that firms must respond to ecological constraints by developing capabilities such as pollution prevention, product stewardship, and sustainable development (Hart, 1995). Within this framework, environmental orientation and entrepreneurial orientation can be interpreted as strategic capabilities that enable firms to integrate environmental management practices with innovation and operational effectiveness, ultimately supporting sustainable competitive advantage.

Despite the growing number of empirical studies examining Green Entrepreneurial Orientation and Environmental Orientation, the literature within the environmental management and sustainability research domain remains fragmented. Existing studies are dispersed across multiple disciplines and predominantly focus on testing direct or indirect relationships between green orientation and performance outcomes within specific contexts. Consequently, there is limited understanding of how GEO and EO research has evolved over time, which themes dominate the intellectual structure of the field, and how these orientations are positioned within environmental management literature from a broader perspective.

Specifically, three critical research gaps remain unaddressed in the existing literature: (1) there is no comprehensive global bibliometric map that systematically integrates GEO and EO research across disciplines and databases; (2) there is no structured analysis of the thematic evolution and intellectual trajectory of this research field over time; and (3) the conceptual relationship between EO and GEO has not been clearly positioned or mapped within the broader

environmental management literature. These gaps limit understanding of how sustainability-oriented strategic orientations have developed and where future research should focus.

To address this gap, this study conducts a bibliometric review of global research on Green Entrepreneurial Orientation and Environmental Orientation published between 2010 and 2025. By employing science mapping techniques—including network visualization, overlay visualization, and density visualization—this study systematically maps publication trends, thematic clusters, and the evolution of GEO and EO research within sustainability and environmental management studies. The findings aim to provide a structured overview of the research landscape and offer insights into how environmental and entrepreneurial orientations contribute to the development of effective environmental management practices and organizational performance. This study also provides a foundation for future empirical research and policy discussions related to sustainability-oriented environmental management.

METHOD

Data Collection and Selection

This study adopts a bibliometric research approach to systematically examine the development and intellectual structure of research related to environmental orientation and green entrepreneurial orientation. Bibliometric analysis enables researchers to quantitatively evaluate scientific publications and identify patterns of knowledge development, thematic relationships, and emerging research trends within a particular field (Donthu et al., 2021; Ferraris et al., 2019). Compared with traditional literature reviews, this approach provides a more objective and reproducible method for synthesizing large volumes of academic publications.

The bibliographic data were collected from the Semantic Scholar database, which provides extensive interdisciplinary coverage of peer-reviewed journal articles. The search process focused on publications related to environmental orientation, entrepreneurial orientation, and sustainability-oriented entrepreneurship published between 2010 and 2025. After applying inclusion and exclusion criteria and removing duplicate records, the dataset was refined and limited to 1,000 relevant journal articles to ensure analytical clarity and network stability during visualization.

Bibliometric Analysis

Prior to analysis, data cleaning procedures were conducted to improve consistency across keywords and metadata. Similar terms referring to identical concepts were standardized, while overly general or irrelevant keywords were excluded to reduce analytical noise. This process ensured that the resulting network structure accurately reflected meaningful conceptual relationships.

Bibliometric mapping and visualization were performed using VOSviewer version 1.6.20. The analysis employed author keywords as the unit of analysis using a full counting method. A minimum occurrence threshold of five keywords was applied to balance network readability and thematic representation. Network visualization was used to identify relationships among research themes, overlay visualization examined the temporal evolution of topics, and density visualization highlighted areas receiving the greatest scholarly attention. These visualizations enabled the identification of dominant research clusters and emerging directions within sustainability-oriented entrepreneurship research.

RESULTS AND DISCUSSION

Result

This study provides a comprehensive bibliometric synthesis of research on Green Entrepreneurial Orientation (GEO) and Environmental Orientation (EO), offering important insights into the intellectual structure, thematic evolution, and strategic orientation of this growing field. By integrating network, overlay, and density visualizations, the findings extend beyond descriptive mapping and contribute to a deeper theoretical understanding of how GEO and EO are positioned within sustainability and strategic management research.

The data collected were analyzed using both qualitative and quantitative approaches with the assistance of Microsoft Excel and VOSviewer software. The results are summarized as follows.

Table 1. Article Distribution and Citation

Publication Year	Number of Articles	% of 1,000	Citations	% of 21,375
2010	30	3.00	1,875	8.77
2011	32	3.20	2,914	13.63
2012	48	4.80	1,418	6.63
2013	33	3.30	711	3.33
2014	53	5.30	953	4.46
2015	49	4.90	949	4.44
2016	47	4.70	1,520	7.11
2017	51	5.10	685	3.20
2018	60	6.00	1,578	7.38
2019	77	7.70	1,347	6.30
2020	77	7.70	2,603	12.18
2021	72	7.20	1,264	5.91
2022	86	8.60	1,646	7.70
2023	93	9.30	1,187	5.55
2024	109	10.90	619	2.90
2025	83	8.30	106	0.50
Total	1,000	100.00	21,375	100.00

Source: Publish or Perish (PoP) data processing

Over the fifteen-year period (2010–2025), research publications related to Green Entrepreneurial Orientation (GEO) and Environmental Orientation exhibit a fluctuating yet overall upward trend. The highest number of publications occurred in 2024 with 109 articles, while the lowest number was recorded in 2010 with 30 articles. Generally, the trend reflects substantial growth, except in 2019 and 2020, which recorded no increase in publication output, potentially indicating a temporary stagnation in research activity during these years.

In terms of scholarly impact, the highest citation count was observed in 2011 with 2,914 citations (13.63%), suggesting that early publications in this field had a stronger academic influence. Conversely, the lowest citation count appeared in 2025 with 106 citations (0.50%), which is reasonable as recent publications have had limited time to accumulate citations.

Overall bibliometric indicators derived from the dataset include: Total articles: 1,000, Total citations: 21,375, Citations per year: 1,425, Citations per paper: 21.38, Citations per author: 8,932.08, Papers per author: 495.40, Authors per paper: 2.63, h-index: 67, g-index: 120, hI,norm: 42, hI,annual: 2.80, hA-index: 26, Papers with ACC \geq 1: 567, Papers with ACC \geq 2: 427, Papers with ACC \geq 5: 224, Papers with ACC \geq 10: 113, Papers with ACC \geq 20: 41.

Intellectual Structure of GEO and EO Research

The network visualization reveals that GEO and EO form a tightly interconnected conceptual cluster strongly linked to green innovation, sustainability performance, and firm-level capabilities. This finding indicates that the literature increasingly conceptualizes green orientation not merely as an environmental commitment, but as a strategic capability embedded within organizational processes. The dominance of firm-level constructs such as capability, innovation, and performance confirms that GEO and EO are primarily examined through a strategic management lens rather than a purely environmental or ethical perspective.

From an NRBV standpoint, this intellectual structure supports the argument that environmental and entrepreneurial orientations function as valuable and difficult-to-imitate resources. The strong co-occurrence between GEO, innovation capability, and sustainability performance aligns with Hart's (1995) assertion that firms can achieve sustained competitive advantage by transforming environmental challenges into strategic opportunities. Thus, the bibliometric evidence reinforces the relevance of NRBV as a foundational framework for understanding the strategic role of green orientation.

These bibliometric indicators demonstrate that the research landscape surrounding GEO and Environmental Orientation has developed significantly, with strong academic impact, high

author productivity, and substantial collaboration among researchers.

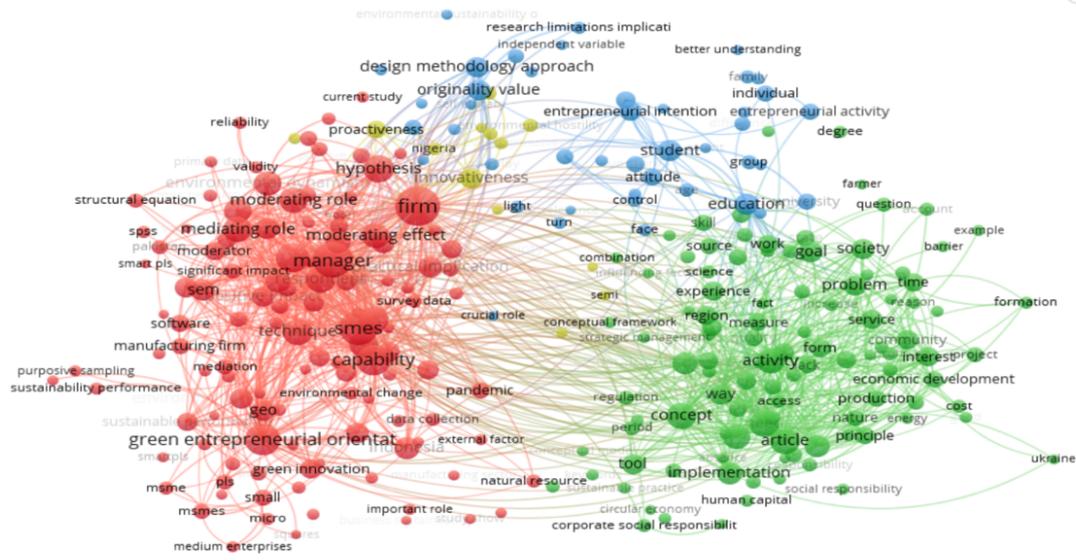


Figure 1. Network Visualization
Source: VOSviewer data processing

Figure 1 illustrates a comprehensive network consisting of 281 terminologies, grouped into four clusters, forming 21,160 links with a strong total link strength of 49,822. Each color represents a major thematic group that frequently appears together across the analyzed publications. The visualization highlights the conceptual structure of the literature on Green Entrepreneurial Orientation (GEO) and Environmental Orientation.

Cluster 1 (Red): Green Entrepreneurial Orientation & Firm-Level Capabilities. This cluster includes key terms such as green entrepreneurial orientation, sustainability performance, capability, manager, firm, SME/MSME, mediating role, moderating effect, SEM, PLS, and innovation capability. This indicates that research in this cluster primarily focuses on green entrepreneurial orientation, organizational and innovation capabilities, and sustainability outcomes. Many studies employ structural equation modeling to examine mediating and moderating mechanisms related to firm performance.

Cluster 2 (Green): Environmental Sustainability, CSR, and Societal Impact. Dominant terms include society, community, economic development, circular economy, corporate social responsibility (CSR), environmental principles, implementation, and activity. This cluster reflects topics related to environmental orientation, social and community sustainability, and CSR-driven environmental practices, highlighting the integration of environmental principles within broader societal and economic development agendas.

Cluster 3 (Blue): Entrepreneurship Education and Entrepreneurial Intention. Key terms include student, entrepreneurial intention, attitude, education, experience, goal, and group. This cluster emphasizes research on entrepreneurship education, students' entrepreneurial attitudes, and intention formation, capturing the cognitive and behavioral dimensions of entrepreneurship research.

Cluster 4 (Yellow): Methodology and Research Approaches. This cluster comprises terms such as design methodology, approach, originality value, research limitation, and conceptual framework. It represents studies focusing on research design, conceptual modeling, and theoretical contributions, indicating methodological discussions and the refinement of conceptual frameworks in related research.

Node Size and Frequency: The size of each node represents the frequency of word occurrence. Larger nodes signify dominant themes in the literature, including green entrepreneurial orientation (red), society, problem, economic development (green), student, attitude (blue).

Node Proximity and Co-Occurrence Strength: The spatial distance between nodes

indicates how often terms appear together. Closer nodes imply strong conceptual association (e.g., green entrepreneurial orientation and capability frequently co-occur).

Distant nodes reflect weaker relationships (e.g., student and firm represent different thematic areas—education vs. organizational studies).

Links and Link Strength: Thicker lines represent stronger co-occurrence relationships, meaning both terms are repeatedly mentioned together in multiple publications. The color of each link follows the color of its corresponding cluster.

Relevance of the Network to Future Research Directions: The map provides important insights for developing future research frameworks, particularly for studies involving Environmental Sustainability Orientation, Entrepreneurial Orientation, Competitive Advantage, and Business/Financial Performance.

Cluster 1 (Red) confirms that green entrepreneurial orientation is strongly linked with capabilities, innovation, sustainability performance, and PLS-SEM methodologies. This aligns with research models proposing that entrepreneurial orientation influences business performance through competitive advantage.

Cluster 2 (Green) demonstrates that environmental orientation is closely associated with CSR, community well-being, and circular economy practices, showing that sustainability-oriented firms integrate social and environmental responsibilities into strategic action (Acosta et al., 2021).

Thematic Evolution and Emerging Research Trends

The overlay visualization highlights a clear temporal evolution in GEO and EO research. Early studies predominantly focused on individual-level factors such as entrepreneurial intention, education, and attitudes, reflecting the initial roots of entrepreneurship research. Over time, the focus shifted toward organizational-level constructs, including managerial capability, firm strategy, and performance outcomes.

More recent research (2023–2025) emphasizes green entrepreneurial orientation, sustainability performance, SMEs/MSMEs, green innovation, and circular economy practices. This shift indicates a maturation of the field toward examining how green orientations are operationalized within firms and how they contribute to tangible strategic outcomes. The prominence of SMEs and MSMEs suggests growing recognition that smaller firms play a critical role in sustainability transitions, particularly in emerging and developing economies.

These trends demonstrate that contemporary GEO and EO research increasingly aligns with NRBV logic, wherein environmental orientation and entrepreneurial behavior are integrated into strategic decision-making processes to generate competitive advantage. The bibliometric patterns suggest that future research is likely to focus on how firms leverage green orientation under conditions of environmental uncertainty, regulatory pressure, and market dynamism.

The overall mapping reveals that SEM and PLS are the dominant analytical techniques and that SMEs and MSMEs represent the most frequently studied organizational context. Thus, this visualization supports the theoretical and empirical foundations for developing models that connect environmental orientation, entrepreneurial orientation, competitive advantage, and firm/business performance in future studies.

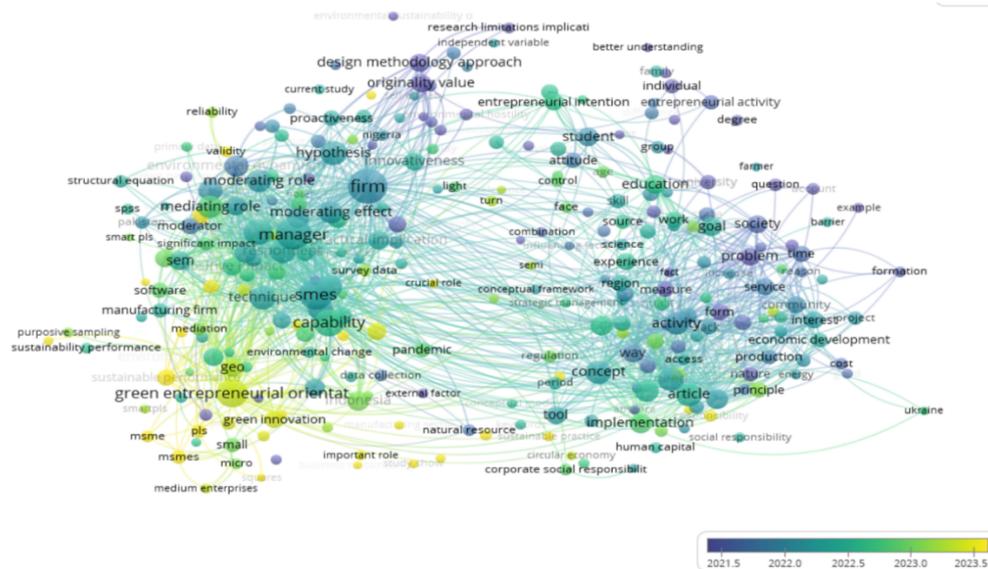


Figure 2. Overlay Visualization
 Source: VOSviewer data processing

Figure 2 presents the overlay visualization that illustrates the temporal evolution of keywords within the dataset. Each node represents a keyword, where the position reflects conceptual proximity, the node size indicates frequency, and the color depicts the average publication year (Avg. Pub. Year). A yellow tone represents newer or emerging themes (2023–2025), while blue–purple colors indicate older and more established research themes (2018–2021). Green nodes represent transitional or developing themes (2021–2022).

- 1) **Early Themes (Blue–Purple), 2018–2021:** Blue–purple nodes represent the earliest research focus areas and well-established themes in the literature. These include: entrepreneurial intention, student, education, attitude, originality/value, design/methodology/approach, innovativeness, hypothesis, reliability, validity. These terms indicate that early studies emphasized entrepreneurship education, entrepreneurial intention, and research methodology development, forming the foundational concepts for subsequent research directions.
- 2) **Transitional Themes (Green), 2021–2022:** Green nodes denote research topics that served as a conceptual bridge toward more advanced, sustainability-oriented studies. Key terms include: firm, manager, capability, moderating role, mediating role, concept, economic development, problem, society. This transition shows a shift from individual-level focus (*e.g.*, students and entrepreneurial intention) toward organizational-level perspectives, including capabilities, managerial roles, and broader socioeconomic issues. These themes laid the groundwork for the rise of sustainability-driven entrepreneurial studies.
- 3) **Emerging Themes (Yellow), 2023–2025:** Yellow nodes represent the most recent and rapidly expanding research areas—the core emerging topics in the 2023–2025 period. These include green entrepreneurial orientation, environmental orientation, green innovation, micro enterprises, SMEs, MSMEs, sustainability performance, CSR implementation, circular economy principles, environmental change, external factors.

These emerging keywords highlight several global shifts: 1) Green Entrepreneurial Orientation (GEO) has become the most prominent and contemporary theme, reflecting rapid growth of research interest. 2) Sustainability performance indicates increasing attention to the measurable impacts of environmental and entrepreneurial orientation on firm outcomes. 3) SMEs/MSMEs emerge as the dominant context for empirical investigations. 4) Environmental Orientation is strongly linked to modern sustainability frameworks and aligns with strategic responses to environmental change. 5) Circular economy and CSR illustrate a strong integration between business environmental responsibility and contemporary sustainable business practices (Roscoe et al., 2016; Sousa-Zomer et al., 2018).

strong global relevance, reinforcing that variables such as environmental orientation and entrepreneurial orientation are currently positioned at the core of research in sustainability-driven entrepreneurship.

Cluster 2 – Firm Capability and Managerial Role

The second bright-yellow area is located at the center of the map, with high-density keywords including firm, manager, capability, techniques/SEM/PLS, mediating role, and moderating effect. This suggests that a substantial portion of the literature focuses on organizational capabilities, managerial roles, and methodological mechanisms such as mediation and moderation. Implication: Studies employing mediation—such as competitive strategy as a mediating variable—are strongly aligned with current global research trends.

Cluster 3 – Sustainability and Societal Topics

The third bright area is positioned on the right side of the map with keywords such as concept, sustainable development, implementation, society/community, economic development, CSR, and circular economy. This cluster demonstrates that the literature not only emphasizes business performance but also integrates broader societal and sustainable development perspectives.

Green Areas – Supporting but Non-Core Topics

Green zones represent frequently occurring themes that support the research structure but are not central. Examples include entrepreneurial intention, education, students/attitudes, innovation, hypothesis, and methodology/validity. These topics are widely discussed but do not constitute the main intellectual focus of green entrepreneurship research.

Blue Areas – Minor or Under-Explored Topics

Blue or light-blue regions represent low-density topics, indicating limited scholarly attention and potential research gaps. Examples include Ukraine, farmer, barrier, and specific regional or sectoral contexts. These areas provide opportunities for future research, especially studies addressing contextual, geographical, or sector-specific challenges.

This finding has important theoretical implications. It suggests that GEO and EO alone do not automatically lead to superior performance; instead, their effects are realized through strategic configurations and capability development (Teece, 2019). From an NRBV perspective, this reinforces the notion that competitive advantage arises not from environmental orientation per se, but from a firm's ability to deploy and reconfigure green resources in ways that competitors cannot easily replicate (Liu et al., 2017).

Discussion

Theoretical Implications for the Natural Resource-Based View

This study contributes to the NRBV literature by providing bibliometric evidence that supports and extends its core propositions. First, the strong linkage between GEO, EO, and innovation capability underscores the role of environmental orientation as a strategic resource rather than a compliance-driven activity. Second, the prominence of performance-related outcomes confirms that sustainability-oriented strategies are increasingly evaluated in terms of their contribution to competitive advantage and business performance.

Moreover, the thematic evolution identified in this study suggests that NRBV research is moving toward a more integrative perspective that combines environmental strategy, entrepreneurship, and competitive dynamics. By mapping how GEO and EO research clusters around innovation, capability, and performance, this study clarifies the mechanisms through which environmental and entrepreneurial orientations contribute to value creation within firms.

Strategic and Managerial Implications

From a strategic perspective, the findings highlight that firms seeking sustainable competitive advantage must embed green orientation into their core entrepreneurial and strategic processes. GEO and EO should not be treated as isolated sustainability initiatives, but as strategic orientations that guide innovation, resource allocation, and market positioning.

For managers, the results suggest that developing green innovation capability and aligning it with competitive strategy is essential for translating environmental orientation into performance gains (Chen et al., 2012). This is particularly relevant for SMEs and MSMEs, which dominate the recent literature and often face resource constraints (Ardito et al., 2021). By leveraging green orientation strategically, smaller firms can differentiate themselves, enhance legitimacy, and build resilience in increasingly competitive and regulated markets (Li et al., 2020).

Policymakers may also draw insights from this study, as the growing emphasis on SMEs indicates the importance of supportive institutional frameworks that encourage sustainability-driven entrepreneurship among SMEs (Muhyi et al., 2017). Policies that facilitate green innovation, knowledge sharing, and capability development can amplify the strategic impact of GEO and EO at the firm level (Wahab et al., 2012).

Future Research Directions

The bibliometric patterns identified in this study suggest several promising avenues for future research. First, empirical studies should further examine the mediating role of competitive strategy and green innovation in the relationship between GEO, EO, and business performance. Second, future research could explore moderating factors such as environmental turbulence, regulatory intensity, and market uncertainty to better understand the boundary conditions of NRBV-based strategies. Third, cross-country and sectoral comparative studies are needed to assess how institutional and contextual differences influence the strategic effectiveness of green orientation.

CONCLUSION

This study provides a comprehensive bibliometric synthesis of the development of research on Green Entrepreneurial Orientation (GEO) and Environmental Orientation (EO) from 2010 to 2025 by employing network visualization, overlay visualization, and density visualization approaches. The findings indicate that GEO and EO are no longer viewed merely as expressions of environmental concern or regulatory compliance, but have evolved into strategic orientations embedded within firm capabilities, green innovation processes, and competitive strategies. These results reinforce the Natural Resource-Based View (NRBV) framework, which emphasizes that environmental and entrepreneurial orientations can function as strategic resources that contribute to sustainable competitive advantage and improved business performance, particularly through the development of green innovation capabilities and strategic mechanisms that mediate the relationship between environmental orientation and firm outcomes.

Based on these findings, it is recommended that firms and entrepreneurs, particularly those operating as SMEs and MSMEs, integrate green orientation into their core entrepreneurial and strategic processes rather than treating sustainability as a peripheral initiative. Strengthening green innovation capabilities and aligning them with competitive strategies are essential steps for translating environmental commitment into measurable performance improvements. Policymakers are also encouraged to design institutional frameworks that support sustainability-driven entrepreneurship through appropriate regulations, incentives, and innovation ecosystems. Future research should complement bibliometric insights with empirical studies that directly examine the mediating and moderating mechanisms linking GEO, EO, competitive strategy, and business performance through cross-country, sector-specific, and longitudinal analyses to deepen understanding of how sustainability-oriented strategies operate across different institutional and market contexts.

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AUTHOR CONTRIBUTION STATEMENT

Suroto is the sole author and was responsible for the conceptualization, methodology, data collection, analysis, and writing of the manuscript. This study was conducted under his direction, and he also played a key role in reviewing and editing the final version of the manuscript.

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