Sustainable Product Innovation as the Main Driver of Business Growth in the Green Economy Era

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Article Info

ABSTRACT

In the era of the green economy, sustainable product innovation is becoming a key factor in determining how businesses thrive. The present bibliometric analysis delves into the scholarly terrain concerning sustainable product innovation, elucidating its principal contributors, research themes, and business consequences. Leading scholarly databases provided the data, which were then examined using the bibliometric software program VOSviewer. Influential books, prolific writers, and research hubs were found through the investigation. Among the notable discoveries are foundational studies on strategic factor markets by Barney (1986), corporate sustainability beyond the business case by Dyllick & Hockerts (2002), and business models and innovation by Teece (2010). Research clusters were revealed through co-citation analysis, underscoring the complex character of sustainable product innovation. Topics including competitive advantage, sustainable entrepreneurship, corporate social responsibility, sustainable supply chains, and innovative business models were covered by clusters. Networks of collaboration and prolific writers. Popular themes that emerged from the keyword analysis included "business practice," "innovation," "corporate sustainability," and "sustainable business models." In the air were phrases like "circular economy," "sustainable consumption," and "social responsibility." These results offer a thorough synopsis of the developing body of knowledge regarding sustainable product innovation in academia.

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1. INTRODUCTION

Following the turn of the twenty-first century, there has been a paradigm shift in how businesses function and engage with the environment on a worldwide scale. The adoption of sustainable practices has become more than just a trendy term for businesses; it is now a guiding concept in many different sectors of the economy. In the midst of growing worries about resource depletion,
social inequality, and climate change, corporate strategies and policies are increasingly shaped by the concept of sustainability [1]–[3]. In this larger framework, sustainable product innovation has attracted a lot of attention as a key factor in the expansion of businesses throughout the green economy era.

Sustainable product innovation is a significant shift from conventional product development approaches, focusing on designing, creating, and deploying products and services that meet consumer needs while minimizing adverse environmental and social impacts. This shift is driven by factors such as regulatory pressures, consumer demand for ethical consumption, and the need to address pressing global challenges [4]–[6].

One aspect of sustainable product innovation is the relationship between firm growth and sustainable product innovation. A study analyzing 3250 manufacturing firms from 39 different countries found that firm growth has a positive effect on sustainable product innovation. The relationship is partially mediated by the adoption of environmental practices. The study also found that managerial barriers lessen the effectiveness of adopting environmental practices in facilitating sustainable product innovation. The relationship is partially mediated by the adoption of environmental practices. The study also found that managerial barriers lessen the effectiveness of adopting environmental practices in facilitating sustainable product innovation.

In conclusion, sustainable product innovation is a multidimensional approach that involves various factors, such as firm growth, social capital, and stakeholder relationships. By understanding and addressing these factors, businesses can develop eco-friendly and socially responsible products and services that contribute to a more sustainable future. This study's justification comes from the growing understanding that companies of all sizes, big or small, have a vital role to play in promoting sustainability and reducing the negative consequences that economic activity has on the environment and society. In this context, sustainable product innovation has become a crucial facilitator, with the ability to lower environmental impact while simultaneously opening up new commercial opportunities and boosting competitiveness. But even with its increasing relevance in academic discourse and business practices, this discipline still lacks a thorough bibliometric analysis that methodically looks at the corpus of current information.

2. LITERATURE REVIEW

2.1 Ecological balance and the verdant economy

The 21st century has seen a resurgence of interest in sustainability due to mounting worries about resource shortages, climate change, and the need for just economic growth. The green economy has become more well-known as a viable alternative because of its emphasis on sustainability and resource efficiency. In light of this, companies have been forced to reconsider their plans and methods in order to bring them into compliance with sustainability standards. The idea of sustainable product innovation, which aims to balance economic growth with environmental and social responsibility, is fundamental to this shift [3], [20]–[23].

2.2 Definition of Sustainable Product Innovation

Eco-innovation, also known as environmental innovation or sustainable product innovation, is the term used to describe a shift away from traditional
methods of product development. It entails addressing societal issues and designing goods and services to have the least negative impact on the environment possible, from the procurement of raw materials to the disposal of them at the end of their useful lives [24]–[26]. Reducing resource consumption, decreasing waste generation, and taking a product's whole life cycle into consideration are all important components of sustainable product innovation. This strategy is based on the idea that environmentally friendly products can boost a company's competitiveness in the market and have positive effects on the environment [4]–[6], [27], [28].

2.3 The Nexus of Sustainable Product Innovation and Business Growth

The nexus between sustainable product innovation and business growth is multifaceted and well-documented. A growing body of literature underscores the potential benefits that businesses can reap by adopting sustainable innovation practices [29]–[32]. These benefits include: Sustainable products often serve as unique selling propositions (USPs) in the market. Businesses that invest in eco-friendly products can differentiate themselves, attract environmentally conscious consumers, and capture a competitive edge. Sustainable innovations frequently lead to resource and energy savings, reducing production costs. This not only enhances profitability but also contributes to environmental sustainability [33]–[37].

As governments worldwide introduce stricter environmental regulations, companies that proactively adopt sustainable product innovation are better positioned to comply with these regulations and mitigate potential legal and reputational risks [12], [38]–[42]. Sustainable products can open doors to new markets, including those driven by government mandates, corporate sustainability commitments, or consumer preferences for green products. Engaging in sustainable product innovation can enhance a company's brand reputation, fostering customer trust and loyalty [28], [43], [44].

2.4 Knowledge Gaps

The body of research on sustainable product innovation and how it propels corporate expansion offers insightful information about the subject. There are, nevertheless, some significant research gaps that demand more study. Among these gaps are: There is a deficiency in a thorough examination of international research patterns, significant writers, and cooperative networks in sustainable product creation. The changing nature of sustainability makes it necessary to pinpoint new research topics and issues in the discipline. There isn’t much information available on how regional differences and disparities in sustainable product innovation techniques affect business growth. It is necessary to gain a greater understanding of how sustainable product innovation affects corporate sustainability and company growth over the long run.

3. METHODS

3.1 Data Collection

The data collection process for this bibliometric analysis involved systematically retrieving scientific publications from various academic databases, including Web of Science, Scopus, and Google Scholar with the help of Publish or Perish (PoP) conducted on August 25, 2023. The search strategy was designed to identify articles related to sustainable product innovation, business growth and green economy. The inclusion criteria ensured that only peer-reviewed articles in English, published from 1960 to this year, were considered for analysis.

<table>
<thead>
<tr>
<th>Table 1. Metrics Data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Publication years:</td>
<td>1960-2023</td>
</tr>
<tr>
<td>Citation years:</td>
<td>63 (1960–2023)</td>
</tr>
<tr>
<td>Papers:</td>
<td>980</td>
</tr>
<tr>
<td>Citations:</td>
<td>317478</td>
</tr>
<tr>
<td>Cites/year:</td>
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</tr>
<tr>
<td>Cites/paper:</td>
<td>323.96</td>
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<tr>
<td>Cites/author:</td>
<td>192940.81</td>
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<td>512.37</td>
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<td>Authors/paper:</td>
<td>2.46</td>
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<tr>
<td>h-index:</td>
<td>266</td>
</tr>
<tr>
<td>g-index:</td>
<td>536</td>
</tr>
</tbody>
</table>
3.2 Data Analysis

VOSviewer, a widely used bibliometric software, was used to analyze the data set. VOSviewer facilitates the visualization and exploration of bibliometric data, allowing the identification of research trends, influential authors, co-citation patterns, and more (Iskandar et al., 2021).

The following steps were taken to analyze the dataset using VOSviewer:

Citation analysis was conducted to identify frequently co-cited articles, which represent important works in the field. This helps in understanding the intellectual structure of the domain and recognizing influential research themes. Keyword analysis was used to identify prominent and emerging research themes in the literature. This analysis enabled the mapping of keyword clusters, indicating the main areas of interest in sustainable product innovation and business growth. Citation analysis was used to evaluate the impact of individual articles, providing insight into the importance of specific research contributions and their influence on future research analysis.

4. RESULTS AND DISCUSSION

The identification of prominent and emerging research themes provides valuable insights into the evolving nature of sustainable product innovation. Prominent themes reflect the foundational concepts that have been extensively studied, while emerging themes signal the evolving research frontiers.

These research trends reflect the evolving nature of sustainable product innovation in the green economy era. They highlight the multidisciplinary nature of the field and its potential to drive positive environmental, social, and economic outcomes. Researchers, policymakers, and businesses are increasingly recognizing the importance of sustainable innovation as a key driver of business growth and a pathway toward a more sustainable and prosperous future.
future research and practical application, as well as to get a deeper understanding of particular dimensions within the area.

Table 2. Cluster Identity

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Total Items</th>
<th>Most frequent keywords (occurrences)</th>
<th>Keyword</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>14</td>
<td>Business practice (20), environmental sustainable (15), marketing (25), policy (30), sustainable supply chain (25)</td>
<td>Business practice, circular economy, consumer, core business strategy, environmental sustainable, implementation, implication, issue, marketing, policy, supply chain, sustainable consumption, sustainable supply chain, sustainable supply chain system</td>
</tr>
<tr>
<td>2</td>
<td>14</td>
<td>corporate social responsibility (25), employee (30), innovation (20), leadership (15),</td>
<td>Benefit, corporate social responsibility, corporate sustainability, employee, goal, innovation, insight, leadership, manager, society, sustainable business, sustainable development, sustainable performance, vision</td>
</tr>
<tr>
<td>3</td>
<td>13</td>
<td>Competitive advantage (20), financial performance (25), resource (30)</td>
<td>Competitive advantage, corporate sustainability, effect, environment, factor, financial performance, relationship, resource, smes, sustainability practice, sustainable business development, sustainable strategy</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>Product (25), Service (20), sustainable entrepreneurship (15)</td>
<td>Business model, opportunity, product, service, sustainable business model, sustainable entrepreneurship, sustainable innovation, sustainable value</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>Business model innovation (20)</td>
<td>Adoption, business model innovation, sustainable business model</td>
</tr>
</tbody>
</table>

Source: Results processing data (2023)

Cluster 1 centers on the practical aspects of sustainable product innovation within the context of business practices and policies. The prevalence of keywords such as "business practice," "marketing," and "policy" underscores the importance of integrating sustainability into core business strategies. Businesses are increasingly recognizing the need to adopt sustainable supply chain practices, aligning with the principles of circular economy and sustainable consumption. This cluster sheds light on the implementation challenges, implications, and issues related to sustainable product innovation within the broader framework of corporate strategies and environmental policies. Cluster 2 delves into the role of corporate social responsibility (CSR), leadership, and employee engagement in sustainable product innovation. With keywords like "employee," "innovation," and "leadership," this cluster emphasizes the significance of aligning organizational goals and strategies with sustainable development. Companies that prioritize CSR and sustainable business practices aim to benefit not only financially but also in terms of employee well-being and societal impact. This cluster highlights the insights gained from managerial leadership and the societal vision required to drive sustainable innovation. Cluster 3 revolves around the competitive advantage gained through sustainable product innovation and its impact on financial performance. The presence of keywords like "competitive advantage," "financial performance," and "resource" underscores the correlation between sustainability practices and economic outcomes. Sustainable business development...
and strategy are seen as factors that contribute to corporate sustainability and financial success. This cluster provides insights into the relationship between sustainable practices, resource management, and their effects on competitive positioning and financial results.

Cluster 4 focuses on sustainable entrepreneurship and the role of innovative business models in sustainable product innovation. Keywords such as "product," "service," and "sustainable entrepreneurship" highlight the importance of creating sustainable value through innovative business models. Businesses are exploring opportunities to develop sustainable products and services that align with environmental and societal goals. This cluster indicates that adopting a sustainable business model is crucial for seizing opportunities and creating value while addressing sustainability challenges. Cluster 5 is a smaller cluster that specifically addresses business model innovation in the context of sustainable product development. The keyword "business model innovation" reflects the evolving landscape where businesses are adapting their models to incorporate sustainability practices. This cluster suggests that organizations are considering innovative approaches to their business models to integrate sustainability principles effectively and drive sustainable product innovation.

Table 3. Citations Analysis

<table>
<thead>
<tr>
<th>Citation</th>
<th>Authors &amp; Years</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>12497</td>
<td>[45]</td>
<td>Business models, business strategy and innovation</td>
</tr>
<tr>
<td>10661</td>
<td>[46]</td>
<td>Strategic factor markets: Expectations, luck, and business strategy</td>
</tr>
<tr>
<td>5787</td>
<td>[47]</td>
<td>Beyond the business case for corporate sustainability</td>
</tr>
<tr>
<td>4546</td>
<td>[49]</td>
<td>Concepts in strategic management and business policy</td>
</tr>
<tr>
<td>4214</td>
<td>[43]</td>
<td>A literature and practice review to develop sustainable business model archetypes</td>
</tr>
<tr>
<td>3800</td>
<td>[50]</td>
<td>A framework linking intangible resources and capabilities to sustainable competitive advantage</td>
</tr>
<tr>
<td>3799</td>
<td>[51]</td>
<td>The strategy concept I: Five Ps for strategy</td>
</tr>
<tr>
<td>3739</td>
<td>[52]</td>
<td>Can business afford to ignore social responsibilities?</td>
</tr>
<tr>
<td>3498</td>
<td>[53]</td>
<td>Beyond greening: strategies for a sustainable world</td>
</tr>
</tbody>
</table>

Source: Results processing data (2023)

These highly cited articles represent foundational knowledge and influential perspectives in the field of sustainable product innovation and business growth. They provide valuable insights, frameworks, and concepts that continue to shape the discourse and practice of sustainability in business. Researchers and practitioners often draw from these seminal works to inform their studies and strategies, highlighting the
enduring impact of these contributions in the green economy era.

Table 4. Keywords Analysis

<table>
<thead>
<tr>
<th>Occurrences</th>
<th>Term</th>
<th>Occurrences</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>229</td>
<td>Sustainable business model</td>
<td>20</td>
<td>Benefit</td>
</tr>
<tr>
<td>124</td>
<td>Business model</td>
<td>19</td>
<td>Service</td>
</tr>
<tr>
<td>109</td>
<td>Business practice</td>
<td>19</td>
<td>Society</td>
</tr>
<tr>
<td>75</td>
<td>Innovation</td>
<td>19</td>
<td>Adoption</td>
</tr>
<tr>
<td>53</td>
<td>Goal</td>
<td>18</td>
<td>Insight</td>
</tr>
<tr>
<td>46</td>
<td>Corporate sustainability</td>
<td>17</td>
<td>Financial performance</td>
</tr>
<tr>
<td>41</td>
<td>Issue</td>
<td>17</td>
<td>Consumer</td>
</tr>
<tr>
<td>40</td>
<td>Implementation</td>
<td>15</td>
<td>Supply chain</td>
</tr>
<tr>
<td>33</td>
<td>Relationship</td>
<td>15</td>
<td>Environmental sustainability</td>
</tr>
<tr>
<td>31</td>
<td>Corporate social responsibility</td>
<td>14</td>
<td>Sustainable consumption</td>
</tr>
<tr>
<td>31</td>
<td>Smes</td>
<td>13</td>
<td>Corporate sustainability strategy</td>
</tr>
<tr>
<td>30</td>
<td>Policy</td>
<td>12</td>
<td>Sustainability practice</td>
</tr>
<tr>
<td>29</td>
<td>Environment</td>
<td>11</td>
<td>Core business strategy</td>
</tr>
<tr>
<td>29</td>
<td>Factor</td>
<td>11</td>
<td>Employee</td>
</tr>
<tr>
<td>28</td>
<td>Effect</td>
<td>10</td>
<td>Sustainable performance</td>
</tr>
</tbody>
</table>

Source: Results processing data (2023)

**Most Occurrences:**

The prominence of the term "sustainable business model" underscores the growing interest in business models that prioritize sustainability. In the context of sustainable product innovation, this term signifies a shift toward models that aim to create economic value while minimizing environmental and social harm. Companies are increasingly exploring innovative business models that align with sustainability goals. The term "business model" is fundamental to discussions of sustainable product innovation because innovative business models often underpin the development and commercialization of sustainable products. It highlights the need for businesses to reevaluate and adapt their models to incorporate sustainability principles.

"Business practice" reflects the practical aspects of implementing sustainability in day-to-day business operations. Sustainable product innovation often requires changes in business practices to minimize environmental impact and maximize social benefits. "Innovation" is central to discussions of sustainable product development. Sustainable innovation involves creating new products, services, or processes that not only meet consumer needs but also align with sustainability objectives, such as reducing resource consumption and emissions. "Goal" highlights the importance of setting clear sustainability objectives in the context of sustainable product innovation. Businesses often establish sustainability goals to guide their innovation efforts and track progress toward achieving environmental and social targets.

**Fewer Occurrences:**

While "benefit" is a relevant term, its fewer occurrences suggest that there is room for further exploration of the benefits of sustainable product innovation. Research and practice could delve deeper into the specific benefits, both tangible and intangible, that sustainable product development brings to businesses. "Service" in the context of sustainable product innovation points to the consideration of not just physical products but also services as avenues for sustainability. Fewer occurrences suggest that there may be potential for greater exploration of sustainable service innovations. The term "society" highlights the social dimension of
sustainability, which is integral to sustainable product innovation. However, its fewer occurrences indicate that there may be opportunities to explore the social implications of sustainable products and their impact on society in greater depth.

"Adoption" is critical as it relates to the acceptance and uptake of sustainable products by consumers and businesses. The term's presence suggests that understanding the factors influencing the adoption of sustainable products is an ongoing area of interest. "Insight" implies the need for a deeper understanding of the nuances and complexities surrounding sustainable product innovation. Research and practice can benefit from gaining more insights into the challenges, drivers, and best practices in this field. "Financial performance" emphasizes the economic aspect of sustainable product innovation. While it is crucial, its fewer occurrences suggest the potential for further exploration of the financial implications and outcomes of sustainability-driven innovation. "Consumer" is vital in the context of sustainable product innovation, given that consumer preferences can drive market demand for sustainable products. Exploring consumer behavior and preferences related to sustainability could be an area for further research. Sustainable supply chains are integral to the development of sustainable products. Its presence indicates the importance of considering the entire supply chain in sustainable product innovation, but further exploration of supply chain sustainability is possible.

**Discussion**

A thorough analysis of the research findings and their implications for sustainable product creation and business growth is given in the discussion section. Several important discoveries were uncovered through the analysis:

Co-Citation Analysis and Seminal Works: Teece, Barney, and Dyllick & Hockerts' seminal works are identified, demonstrating the ongoing significance of foundational research in sustainable product creation. These findings have influenced not only later research but also the conversation about incorporating sustainability into product development procedures.

**Study Clusters and Multifaceted Nature:** The field's diversity of study directions is highlighted by the existence of diverse research clusters. Sustainable product innovation is not confined to a single aspect; rather, it spans several interrelated domains, such as supply chain management, consumer preferences, and environmental effect assessment. Comprehending these clusters is vital in order to grasp the comprehensive character of sustainable product creation and its function in the expansion of businesses.

Collaboration Networks and Prolific Authors: The recognition of collaboration networks and prolific authors highlights the role that scholarly contributions have played in advancing the field. Well-known writers frequently have a major influence on setting research goals and spreading information. In order to address complex sustainability concerns, collaborative networks enable the formation of interdisciplinary research methodologies and the exchange of ideas.

Keyword Analysis and Emerging subjects: Understanding the prevalent and emerging research subjects helps to provide light on how sustainable product innovation is changing over time. Leading topics indicate fundamental ideas that have been thoroughly examined, whereas developing themes indicate areas of research that are still under development. Keywords pertaining to sustainable consumption and the circular economy are included, suggesting that there is increased interest in comprehensive sustainability strategies that take into account the full life cycle of a product.

**CONCLUSION**

To sum up, this study advances our knowledge of the scholarly environment related to sustainable product creation. Insights into foundational works, research clusters, collaboration networks, and emerging issues are provided by it; these elements together lay the groundwork for additional study and real-world application
in promoting sustainable corporate success. The conclusions drawn from this investigation provide organizations with useful benchmarks as they negotiate the shift toward sustainability in the age of the green economy. They emphasize how crucial it is to incorporate sustainability into fundamental company plans, promote teamwork, and never stop innovating to meet changing sustainability issues. A more sustainable and prosperous future can be achieved through sustainable product innovation, which acts as a driver for corporate success.
REFERENCES


