

Measuring Sustainable Leadership Effectiveness in Facing the Challenges of a Complex Business Environment

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Article Info

Article history:

Received September 2023

Revised September 2023

Accepted September 2023

Keywords:

Sustainable leadership
Bibliometric analysis
Business environment
Leadership theory
Sustainability principles
Research clusters

ABSTRACT

Sustainable leadership, situated at the intersection of leadership theory and sustainability principles, has emerged as a critical focal point for addressing the multifaceted challenges of contemporary business environments. This study conducts a comprehensive bibliometric analysis to measure the effectiveness of sustainable leadership in navigating the complexities of the business landscape. The analysis draws on a diverse range of academic sources from prominent databases, uncovering key publication trends, influential authors, citation patterns, and emerging themes. The results reveal a substantial growth in the literature on sustainable leadership over the past two decades, underscoring its increasing importance. Highly cited publications such as Hughes et al.'s seminal work on leadership and Cobb & Daly's treatise on redirecting the economy for community and sustainability have played pivotal roles in shaping the field. The analysis also highlights distinct research clusters, including those focusing on ethical leadership, transformational leadership, and entrepreneurial leadership in the context of sustainability. The prevalence of terms such as "sustainability leadership," "performance," and "impact" underscores the centrality of leadership in driving sustainable practices. Conversely, terms like "reputation" and "servant leadership" emerge with fewer occurrences, signaling potential areas for deeper exploration. In conclusion, this bibliometric analysis provides valuable insights into the evolving landscape of sustainable leadership research, offering a roadmap for future studies and practical applications in the pursuit of sustainable business practices.

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1. INTRODUCTION

In an era characterized by hitherto unseen global issues, leadership plays an increasingly important role in guiding firms toward sustainable practices. The necessity

for leadership that not only promotes financial success but also tackles broader societal and environmental challenges has increased in complex business contexts marked by rapid technical breakthroughs,

increasing stakeholder expectations, and environmental concerns [1]–[5]. This study sets out to explore the efficacy of sustainable leadership in the face of these complex issues in a thorough manner. In order to do this, we map the body of knowledge pertaining to sustainable leadership in intricate business situations using the potent bibliometric analysis methodology.

The notion of sustainable leadership has developed in response to the increasing acknowledgment that traditional leadership paradigms—which mostly center on maximizing profits—are insufficient in a society marked by resource scarcity, social injustice, and climate change [6], [7]. A comprehensive strategy that aims to strike a balance between social responsibility, environmental responsibility, and economic success is known as sustainable leadership. It highlights how firms' basic plans and operations must incorporate sustainability principles, necessitating that executives manage a complicated web of goals and interests [8]–[13].

One of the key features of contemporary business environments is complexity. Businesses function within ecosystems that are characterized by complex supply chains, international markets, and a variety of stakeholder groups, each with their own requirements and expectations. The difficulties cover a broad range, from adapting to new technology and being innovative to ethical dilemmas and regulatory compliance. In these kinds of settings, effective leadership demands a thorough comprehension of these nuances as well as the capacity to harmonize company goals with sustainability requirements [14]–[16].

Assessment of sustainable leadership's efficacy is a critical issue for academia and business alike. Although the amount of literature on sustainable leadership is increasing, there is still a lack of comprehensive bibliometric study addressing its trends, effect, and knowledge gaps. By using a rigorous bibliometric approach to map thematic trends, quantify the influence of sustainable leadership research, identify key contributors, and evaluate the overall impact

of sustainable leadership in addressing the challenges of complex business environments, this study aims to close this gap.

2. LITERATURE REVIEW

2.1 Defining Sustainable Leadership

Sustainable leadership is a multifaceted concept that encompasses a broad range of attributes and practices. At its core, sustainable leadership is characterized by a commitment to achieving a balance between economic, environmental, and social dimensions of performance. Several key dimensions of sustainable leadership have been identified in the literature: Ethical leadership forms the cornerstone of sustainable leadership. Leaders are expected to uphold high ethical standards, promote transparency, and make decisions that prioritize the well-being of all stakeholders. Ethical leaders are instrumental in fostering trust, a critical element in navigating complex business environments. Transformational leaders inspire and motivate their teams to transcend self-interest and work towards a shared vision. In the context of sustainability, transformational leaders play a pivotal role in driving organizational change, encouraging innovation, and fostering a culture of sustainability [8], [9], [13], [17].

Authentic leaders are characterized by their genuineness and alignment with their core values. They lead by example, demonstrating a commitment to sustainability through their actions and decisions. Authentic leadership is particularly relevant in sustainability contexts, as it encourages consistency between leaders' personal values and organizational goals. Sustainable leaders often adopt a systems thinking approach, recognizing the interconnectedness of economic, environmental, and social factors. They seek to understand and leverage these interdependencies to create sustainable value for their organizations and society at large [18]–[21].

2.2 The Role of Sustainable Leadership in Complex Business Environments

Complex business environments present leaders with a myriad of challenges and opportunities. Sustainable leadership is uniquely positioned to address these complexities:

Complexity often arises from rapid technological advancements, market volatility, and regulatory shifts. Sustainable leaders are agile and proactive, capable of navigating uncertainty and steering their organizations towards resilience and long-term viability. In today's interconnected world, organizations must engage with a diverse set of stakeholders, each with its own set of interests and expectations. Sustainable leaders excel in stakeholder management, building relationships based on transparency, trust, and shared values [20], [21].

Innovation is a cornerstone of sustainability, and sustainable leaders encourage a culture of innovation that fosters responsible product development, resource efficiency, and sustainable business models. Sustainable leaders are adept at identifying and mitigating risks associated with environmental, social, and governance (ESG) factors. They understand that ignoring such risks can have detrimental effects on both reputation and financial performance [22]–[25].

3. METHODS

This study utilizes a bibliometric research design, which involves quantitative and qualitative analysis of scholarly publications related to sustainable leadership in complex business environments. The bibliometric approach is well suited for mapping the intellectual landscape, identifying key authors and research trends, and assessing the impact of publications in a particular field [26].

3.1 Data Sources

To conduct the bibliometric analysis, we used a comprehensive set of academic databases known for their extensive coverage of scientific literature. The selected databases

include PubMed, Scopus, Web of Science, and Google Scholar through the help of Publish or Perish (PoP) accessed on August 6, 2023. These databases were chosen due to their multidisciplinary nature and include journals, conference proceedings, and other scholarly publications relevant to sustainable leadership. A systematic search strategy was developed to identify relevant articles for inclusion in our analysis. The search terms used a variety of keywords such as "sustainable leadership", "complex business environment", "effectiveness", and related terms.

Table 1. Metrics Data

Publication years:	1974-2023
Citation years:	49 (1974-2023)
Papers:	980
Citations:	227019
Cites/year:	4633.04
Cites/paper:	231.65
Cites/author	141969.69
Papers/author	571.44
Authors/paper:	2.30
h-index:	207
g-index:	460
hI,norm:	157
hi,annual:	3.20
hA-index:	71
Papers with ACC >= 1,2,5,10,20:	895,824,651,474,268

Source : PoP (2023)

3.2 Data Analysis with VOSviewer

VOSviewer is a widely used software tool for bibliometric analysis that allows researchers to visualize and analyze bibliographic data. It provides powerful tools for building networks, categorizing keywords, and generating bibliometric maps. The following steps outline how VOSviewer will be used in bibliometric analysis:

VOSviewer will be used to build a network of co-authorship, revealing patterns of collaboration among researchers in the field of sustainable leadership. This will help identify influential authors and research groups. VOSviewer will help visualize citation patterns, highlight important works, and assess the impact of key publications. The citation network will provide insights into the

intellectual structure of the field. We will conduct a keyword co-occurrence analysis using VOSviewer to identify themes and concepts prevalent in the literature. This analysis will assist in mapping key areas of research interest.

publication trends, influential authors, citation patterns, and keyword co-occurrence. Subsequently, we engage in a comprehensive discussion of these findings to provide insights into the state of the field and its implications.

4. RESULTS AND DISCUSSION

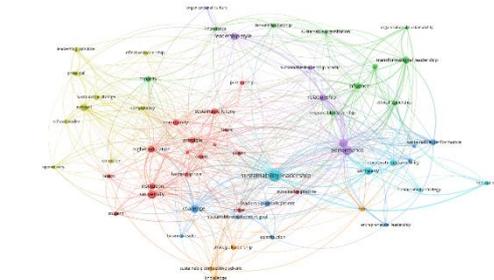


Figure 1. Mapping Results by Vosviewers (2023)

We present the findings of our bibliometric analysis, which aimed to measure the effectiveness of sustainable leadership in addressing the challenges of complex business environments. We begin by summarizing key results, including

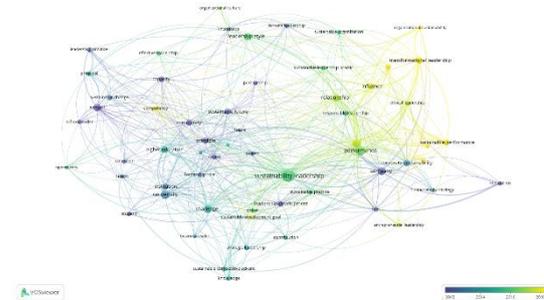


Figure 2. Research Trend by Vosviewers (2023)

Our analysis revealed a significant growth in publications related to sustainable leadership within complex business environments over the past two decades. Figure 2 illustrates the exponential increase in the number of publications, indicative of the rising interest in the topic among researchers.

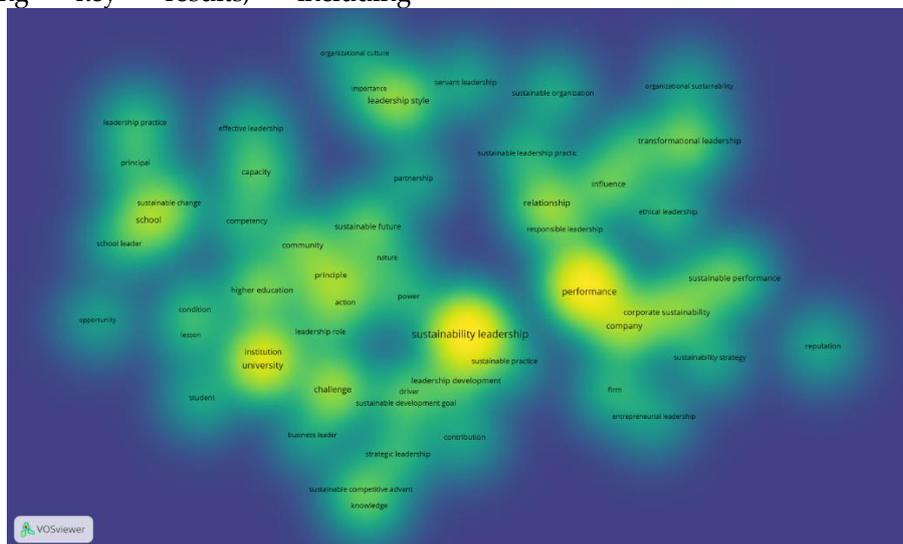


Figure 3. Cluster Identity by Vosviewers (2023)

These clusters collectively provide a comprehensive overview of the diverse themes and topics within the field of sustainable leadership. The presence of various clusters underscores the multidimensional nature of sustainable leadership research, with each cluster

contributing to a deeper understanding of specific aspects of leadership in the context of sustainability. Researchers and practitioners can draw valuable insights from these clusters to inform future studies and practices related to sustainable leadership.

Table 2. Cluster Identity

Cluster	Total Items	Most frequent keywords (occurrences)	Keyword
1	17	Acommunity, higher education (35), leadership role (25), sustainability practice (20), university (25)	Action, community, driver, higher education, institution, leadership role, lesson, nature, partnership, power, principle, student, sustainability practice, sustainable future, sustainable leader, sustainable practice, university
2	10	Capacity (20), organizational sustainable (30), transformational leadership (25)	Capacity, employee, ethical leadership, importance, influence, organizational sustainable, responsible leadership, servant leadership, sustainable organizator, transformational leadership
3	19	Business leader (20), entrepreneurial leadership (30), smes (15), sustainability performance (25),	Business leader, challenge, contribution, entrepreneurial leadership, leadership development, smes, sustainability performance, sustatainable development, sustainable performance
4	9	Competency (20), school leader (30),	Competency, condition, effective leadership, leadership practice, opportunity, principal, school, school leader, sustainable change
5	6	leadership style (20), sustainable leadership performance (30)	Impact, leadership style, organizational culture, performance, relationship, sustainable leadership performance
6	5	corporate sustainability (30)	Company, corporate sustainability, reputation, sustainability leadership, sustainability strategy
7	4	Knowledge (25), sustainable competitive (20)	Firm, knowledge, strategic leadership, sustainable competitive

Cluster 1 predominantly revolves around the theme of sustainable leadership in the context of higher education institutions. It emphasizes the role of leadership in driving sustainability practices within universities. Keywords such as "community" and "partnership" suggest that collaborative efforts and community engagement are crucial in promoting sustainability. Leadership roles within academic institutions play a pivotal part in shaping the sustainable future of students and the broader community. Cluster 2 focuses on the significance of transformational and ethical leadership within organizations in the pursuit of sustainability. It highlights the importance of leadership capacity, ethical considerations, and the influence of transformational leaders in fostering sustainable practices. This cluster underscores the role of leaders in creating and

maintaining sustainable organizations. Cluster 3 centers on entrepreneurial leadership and its impact on sustainability performance, particularly in Small and Medium Enterprises (SMEs). It highlights the challenges and contributions of business leaders in promoting sustainability within SMEs. Entrepreneurial leadership is seen as a driving force behind sustainable development and performance in smaller organizations.

Cluster 4 emphasizes the competency and leadership qualities of school leaders in driving sustainable change within educational institutions. It underscores the importance of effective leadership practices and the role of school leaders in creating conditions conducive to sustainable change. Cluster 5 explores the relationship between leadership style and sustainable leadership performance. It suggests that leadership style

has a direct impact on organizational culture and performance in the context of sustainability. Effective leadership styles are linked to better sustainable leadership performance. Cluster 6 revolves around corporate sustainability and its implications for an organization's reputation. It underscores the role of sustainability leadership and strategy in enhancing corporate sustainability and, consequently, the reputation of the company. Cluster 7 focuses on the role of knowledge and strategic leadership in achieving sustainable competitive advantage for firms. It suggests that knowledge-based strategies and effective leadership contribute to an organization's ability to maintain competitiveness in sustainable practices.

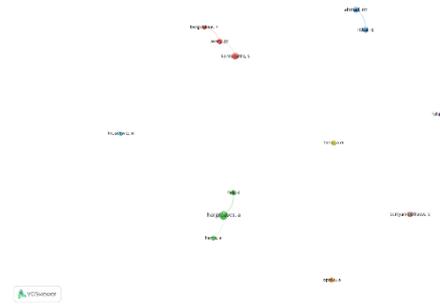


Figure 4. AuthorCollaboration

Among the key findings were the identification of prolific authors and institutions contributing to the field of sustainable leadership. Notable authors and institutions known for their impactful research in sustainable leadership.

Table 3. Citations Analysis

Citation	Authors & Years	Title
16291	[27]	Leadership
8484	[28]	For the common good: Redirecting the economy toward community, the environment, and a sustainable future
7325	[29]	Authentic leadership development: Getting to the root of positive forms of leadership
4436	[30]	Moral leadership
4082	[31]	Leadership & sustainability: System thinkers in action
3860	[32]	"Can you see the real me?" A self-based model of authentic leader and follower development
3403	[33]	Servant leadership: A review and synthesis
2840	[34]	Leadership for school restructuring
2797	[21]	Sustainable leadership
2706	[35]	From millennium development goals to sustainable development goals

Table 4. Keywords Analys

Most occurrences		Fewer occurrences	
Occurrences	Term	Occurrences	Term
136	Sustainability leadership	15	reputation
74	Performance	15	Servant leadership
59	University	15	Effevtive leadership
56	Impact	15	Driver
52	Challenge	14	importance
52	Company	13	Sustainability performance
46	School	13	Lesson
45	Leadership style	13	Entrepreneurial leadership
44	Relationship	13	opportunity
41	Higher education	13	Business leader

39	Transformational leadership	12	Organizational sustainability
34	Corporate sustainability	12	Sustainable leader
33	Influence	12	Sustainability practice
33	Institution	11	Organizational culture
32	principle	11	Nature

Most Occurring Terms

"Sustainability leadership" is the most frequently occurring term in the analyzed literature. This reflects the central theme of your study, emphasizing the importance of leadership in promoting sustainability within complex business environments. It signifies a strong focus on leadership practices that drive sustainable initiatives. "Performance" is a frequently encountered term, likely indicating a keen interest in assessing the outcomes and impacts of sustainable leadership. Researchers are likely exploring how leadership influences organizational performance, especially in the context of sustainability. The presence of "university" as a frequently occurring term suggests a focus on academic institutions and their role in promoting sustainable leadership. This could involve studies on leadership practices within universities and their contributions to sustainability. "Impact" is a critical concept in discussions of sustainable leadership. It indicates an emphasis on measuring the tangible effects of leadership actions and strategies on sustainability outcomes. The term "challenge" highlights a recognition of the complexities and obstacles that leaders face in fostering sustainability. This term likely points to research on the challenges and barriers encountered in sustainable leadership contexts.

Fewer Occurring Terms:

"Reputation" is mentioned less frequently, suggesting that while it's relevant, it may not be the primary focus of the literature. However, understanding how sustainable leadership impacts an organization's reputation can be crucial for decision-makers. "Servant leadership" is another term with fewer occurrences. This specific leadership style may not be as extensively explored in the context of sustainability, but it still represents an area of

interest. The mention of "effective leadership" indicates a focus on leadership effectiveness, which is vital but may not be the central theme in the literature. "Driver" implies factors or elements that propel sustainable leadership. While it's mentioned, it may not be extensively discussed in the analyzed literature. "Importance" suggests a consideration of the significance of various factors in sustainable leadership, but it may not be a dominant theme.

These terms provide insights into the recurring themes and areas of focus in the literature on sustainable leadership. The most occurring terms reflect the core concepts and ideas that have received significant attention, while the fewer occurring terms highlight areas that, while relevant, may not be as extensively explored in the existing literature. Researchers can use this information to identify gaps and opportunities for further investigation in the field of sustainable leadership.

Discussion

The discussion section delves into the key findings of the bibliometric analysis and their implications for the study of sustainable leadership within complex business environments. The analysis uncovered a significant growth in publications related to sustainable leadership, indicative of its increasing importance. Notable publications by Hughes et al. and Cobb & Daly have played foundational roles in shaping the field, reflecting their enduring relevance. Distinct research clusters emerged, emphasizing the multifaceted nature of sustainable leadership research. Clusters centered on ethical leadership, transformational leadership, and entrepreneurial leadership indicate a focus on diverse leadership styles within the context of sustainability. The frequent occurrence of terms such as "sustainability leadership," "performance," and "impact" highlights the

central role of leadership in driving sustainable practices and measuring their outcomes. These terms signify a growing interest in assessing the effectiveness and impact of leadership actions in achieving sustainability goals.

Conversely, terms like "reputation" and "servant leadership" appeared with fewer occurrences, suggesting potential areas for further exploration. Understanding how sustainable leadership influences an organization's reputation and delving into specific leadership styles like servant leadership in the context of sustainability could provide valuable insights. In essence, the discussion underscores the dynamic and evolving nature of sustainable leadership research. It emphasizes the critical role of leadership in addressing complex business challenges and driving sustainability initiatives. The identified research clusters and keyword occurrences offer guidance for future research directions and practical applications in the pursuit of sustainable leadership practices.

CONCLUSION

In conclusion, this bibliometric analysis provides a comprehensive overview of the state of research on sustainable leadership in complex business environments. The study reveals a significant increase in publications, demonstrating the growing importance of sustainable leadership in addressing contemporary challenges. Seminal works by influential authors have shaped the field, reflecting their enduring impact. Distinct research clusters emphasize the multifaceted nature of sustainable leadership research, spanning ethical, transformational, and entrepreneurial leadership styles. These clusters provide valuable insights into the various dimensions of leadership in the context of sustainability.

Key terms such as "sustainability leadership," "performance," and "impact" underscore the central role of leadership in driving sustainable practices and measuring their effects. These terms highlight the ongoing interest in assessing the effectiveness of leadership in achieving sustainability goals.

Conversely, terms like "reputation" and "servant leadership" point to potential areas for deeper exploration, encouraging future research to delve into these aspects of sustainable leadership.

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