

Leadership Development in Sustainable HRM: A Bibliometric Study

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ABSTRACT

This study conducts a comprehensive bibliometric analysis to map the intellectual landscape of leadership development within the field of sustainable human resource management (HRM). Using the Scopus database and visualized through VOSviewer, the analysis explores research patterns, influential authors, institutional collaborations, and thematic evolutions from 2016 to 2024. Findings reveal that *sustainable development* and *leadership* function as central anchors of the literature, with growing emphasis on green HRM, ethical leadership, green transformational leadership, and innovation-driven sustainability. The temporal overlay shows a shift from foundational sustainability concepts toward applied research focused on organizational performance, environmental outcomes, and leadership behaviors that promote employee green practices. Co-authorship and country networks highlight strong global collaboration, particularly among the United Kingdom, China, and India. The study contributes to the theoretical integration of leadership and sustainable HRM while offering practical insights for designing sustainability-oriented leadership development programs. Limitations and future research opportunities are also identified to support continued advancement of this emerging field.

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1. INTRODUCTION

In the past two decades, organizations across industries have faced unprecedented pressure to integrate sustainability principles into their strategic and operational frameworks. This shift is driven not only by regulatory demands but also by increasing societal expectations for environmental stewardship, social responsibility, and ethical governance. Human Resource Management (HRM) has

been increasingly recognized as a pivotal function in translating sustainability values into practice, particularly through talent development and leadership cultivation. As argued by Jackson, Schuler, and Jiang [1], sustainable HRM embodies long-term employee well-being, social protection, and responsible resource use, thereby expanding HRM's role beyond traditional performance metrics. Within this framework, leadership development emerges as a critical mechanism

to ensure that managers and future leaders possess the competencies, values, and perspectives necessary to advance sustainability-oriented agendas.

The concept of sustainable leadership is rooted in strategic human capital theories and stakeholder governance perspectives. Sustainable leaders are expected to demonstrate adaptability, long-term orientation, ethical decision-making, and a capacity to balance competing ecological, social, and economic priorities [2]. As organizations confront climate risks, evolving labor expectations, technological disruptions, and demographic shifts, the cultivation of leaders equipped with sustainable mindsets becomes essential. HRM scholars highlight that leadership development in the sustainability era must incorporate experiential learning, cross-sector collaboration, and capability building in systems thinking and change management [3]. Consequently, sustainable HRM and leadership development form a mutually reinforcing synergy—one that influences organizational learning, resilience, and strategic renewal.

The rise of Sustainable HRM has also been accompanied by broader paradigmatic shifts within global workforce management. Increasing attention to employee well-being, diversity and inclusion, ethical labor practices, and long-term employability underscores the human-centric orientation of contemporary HRM systems. Ehnert, Parsa, Roper, Wagner, and Muller-Camen (2016) emphasize that sustainable HRM integrates social sustainability (e.g., well-being, equity), environmental sustainability (e.g., green HRM), and economic sustainability (e.g., productivity, retention). Leadership development programs are now expected not only to enhance managerial skills but also to cultivate competencies aligned with these sustainability dimensions. This implies a transition from leader-centric models to more collective, collaborative, and values-driven forms of leadership often referred to as “responsible leadership” or “sustainability leadership.”

Bibliometric studies in HRM and leadership research provide an opportunity to systematically map the evolution of concepts, identify influential scholars, track publication trends, and uncover thematic clusters shaping academic discourse. Prior bibliometric works on HRM (e.g., Kramar, 2014; Stahl et al., 2020) and leadership [4], [5] demonstrate how these fields have evolved across decades, adapting to global economic, technological, and societal transformations. However, the intersection between leadership development and sustainable HRM remains relatively fragmented despite its conceptual importance. A bibliometric approach enables researchers to identify patterns, intellectual structures, and emerging hotspots that may not be visible through traditional literature reviews. This systematic mapping can reveal how sustainability considerations have been integrated into leadership development scholarship and where conceptual gaps persist.

Furthermore, the rapid growth of sustainability research calls for analytical methods that can synthesize large volumes of scientific publications efficiently and transparently. Bibliometric techniques allow scholars to trace co-authorship networks, keyword co-occurrences, citation structures, and thematic evolution over time. As observed by Donthu, Kumar, Mukherjee, Pandey, and Lim [6], bibliometric analysis serves as a powerful tool to assess the maturity of a research area, identify its core intellectual foundations, and forecast its future trajectory. Given that sustainable HRM and leadership development are both relatively young but rapidly expanding fields, bibliometric mapping becomes essential for understanding their convergence, interdisciplinary dynamics, and knowledge boundaries. This is particularly relevant for guiding future empirical studies and for informing practitioners who design leadership development initiatives grounded in sustainability values.

Despite the growing scholarly interest in sustainable HRM and the increasing recognition of leadership development as a central enabler of sustainable organizational

transformation, there is still limited integrative understanding of how these two domains intersect in academic discourse. Existing studies often examine sustainable HRM practices or leadership development frameworks separately, with few efforts to systematically analyze their conceptual linkage, evolution, and thematic clusters within the global research landscape. The absence of a comprehensive bibliometric mapping of this intersection hampers the ability of scholars and practitioners to identify dominant themes, research frontiers, influential publications, and gaps that require further exploration. As a result, the field lacks a consolidated knowledge base that can support theory building, inform evidence-based leadership development programs, and enhance the strategic alignment between leadership cultivation and sustainable HRM practices.

The objective of this study is to conduct a comprehensive bibliometric analysis of global scientific publications related to leadership development within the context of sustainable HRM. Specifically, this research aims to map publication trends, identify influential authors and journals, analyze intellectual structures through citation and co-occurrence patterns, and uncover thematic clusters shaping the scholarly landscape. By doing so, the study seeks to provide an integrative overview of the field's evolution, highlight emerging research directions, and contribute to the development of a more unified theoretical and practical understanding of how leadership development supports sustainable HRM in contemporary organizations.

2. METHODS

This study employs a bibliometric analysis approach to systematically map the intellectual structure, thematic evolution, and publication trends related to leadership development in sustainable Human Resource Management (HRM). Bibliometric methods are especially valuable for synthesizing large volumes of scientific literature, allowing researchers to uncover patterns that are not

easily identifiable through conventional qualitative reviews. The analysis focuses on publications indexed in the Scopus database, given its comprehensive coverage of peer-reviewed journals and multidisciplinary scope. To ensure accuracy and relevance, the search strategy included combinations of keywords such as *"leadership development," "sustainable HRM," "responsible leadership," "green HRM,"* and *"sustainability leadership."* The search was limited to article titles, abstracts, and keywords, ensuring that retrieved documents explicitly deal with the intersection of leadership development and sustainability-oriented HRM.

Following data extraction from Scopus, the bibliographic records—including authors, affiliations, publication years, source titles, keywords, abstracts, and reference lists—were exported in CSV format for further processing. The data cleaning process involved removing duplicate entries, filtering irrelevant publications, and standardizing keywords to avoid fragmentation (e.g., merging similar terms such as *"sustainable human resource management"* and *"sustainable HRM"*). Bibliometric indicators such as annual publication trends, citation counts, and author productivity were computed to provide a preliminary descriptive overview of the field. This preprocessing step ensures that the data used in visualization tools accurately reflect the conceptual and thematic structure of the research domain.

The core analytical technique employed in this study is science mapping using VOSviewer, a widely used software for constructing and visualizing bibliometric networks. VOSviewer enables the generation of co-authorship maps, co-occurrence networks of keywords, citation and co-citation analyses, and thematic cluster visualizations. In this study, keyword co-occurrence mapping was used to identify major research themes and their interrelationships, while co-citation analysis provided insights into the foundational theories and influential scholars shaping the domain. Network maps were interpreted based on cluster colors, node distances, link strengths, and density visualization outputs,

allowing for a systematic understanding of how leadership development and sustainable HRM converge in the global academic literature. Through these VOSviewer-based analyses, the study captures the field's

intellectual boundaries, emerging themes, collaborative structures, and potential research directions.

3. RESULTS AND DISCUSSION

3.1 Keyword Co-Occurrence Network

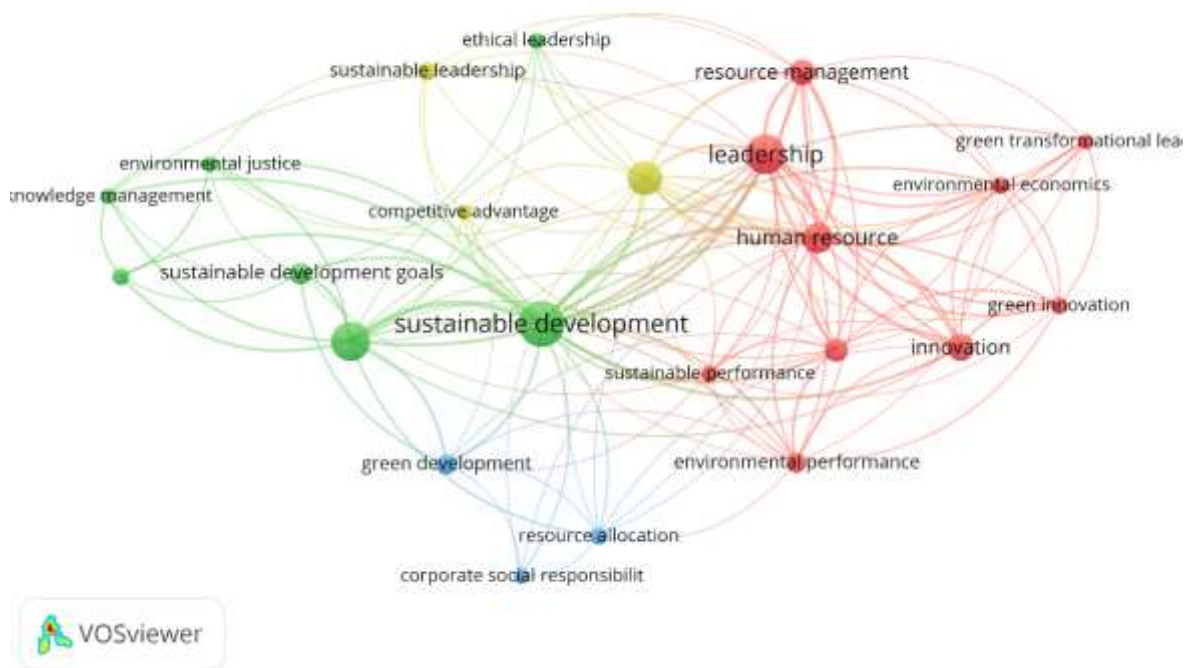


Figure 1. Network Visualization

Source: Data Analysis Result, 2025

The figure represents a keyword co-occurrence network that visualizes how scholarly publications connect concepts related to *leadership*, *sustainable development*, and *sustainable HRM*. The size of each node indicates the frequency of keyword usage, while the colors show thematic clusters. Thicker lines reflect stronger co-occurrence relationships. The map reveals four dominant clusters that collectively define the intellectual structure of research at the intersection of leadership development and sustainability oriented HRM.

Red Cluster: Leadership, HRM, and Green Innovation

This cluster centers on leadership, innovation, and human resource management, reflecting studies focused on

how leadership practices drive organizational sustainability. Keywords such as *leadership*, *human resource*, *resource management*, *green innovation*, *green transformational leadership*, and *environmental performance* indicate a research stream examining the role of leaders in advancing sustainability initiatives within HR systems.

The strong ties between *leadership* and *resource management* highlight interest in leadership capabilities such as decision-making, talent development, and resource stewardship. Meanwhile, the presence of *green innovation* and *environmental economics* suggests that leadership is increasingly studied in relation to eco-efficiency, innovation capacity, and environmental productivity. This cluster represents the core managerial lens of sustainable HRM.

Green Cluster: Sustainable Development Goals and Organizational Sustainability

The green cluster focuses on macro-level sustainability concepts, dominated by keywords such as *sustainable development*, *sustainable development goals (SDGs)*, *environmental justice*, *competitive advantage*, and *knowledge management*. This indicates research that connects leadership development and HRM with broader global sustainability agendas.

The linkage between *knowledge management* and *sustainable development* shows that sustaining long-term growth requires organizational learning, knowledge creation, and capability building. The presence of *environmental justice* reflects a social sustainability dimension equity, fairness, and ethical considerations—which connects closely to sustainability leadership. This cluster signifies the strategic and societal perspective of sustainability.

Yellow Cluster: Ethical and Sustainable Leadership

The yellow cluster highlights leadership styles aligned with sustainability values, shown through keywords such as *ethical leadership*, *sustainable leadership*, and *competitive advantage*. These terms indicate research emphasizing the behavioral and value-driven dimensions of leadership.

Ethical leadership and sustainable leadership are linked closely to both sustainable development (green cluster) and human resource management (red cluster), signaling their role as a conceptual bridge. Studies in this cluster frequently explore how leadership behaviors—ethics, responsibility, long-term orientation—promote sustainable organizational practices. This cluster illustrates the emergence of values-based leadership frameworks in sustainable HRM research.

Blue Cluster: CSR, Resource Allocation, and Green Development

The blue cluster contains keywords like *corporate social responsibility (CSR)*, *resource allocation*, and *green development*, indicating a corporate governance and policy-oriented perspective. Although smaller, this cluster addresses crucial organizational mechanisms that support sustainability performance.

The presence of CSR signals the integration of leadership and HRM with stakeholder responsibility, transparency, and ethical operations. *Resource allocation* suggests the operational side of sustainability—how organizations allocate human, financial, and material resources to achieve green development goals. This cluster represents the organizational policy and governance dimension of sustainable HRM.

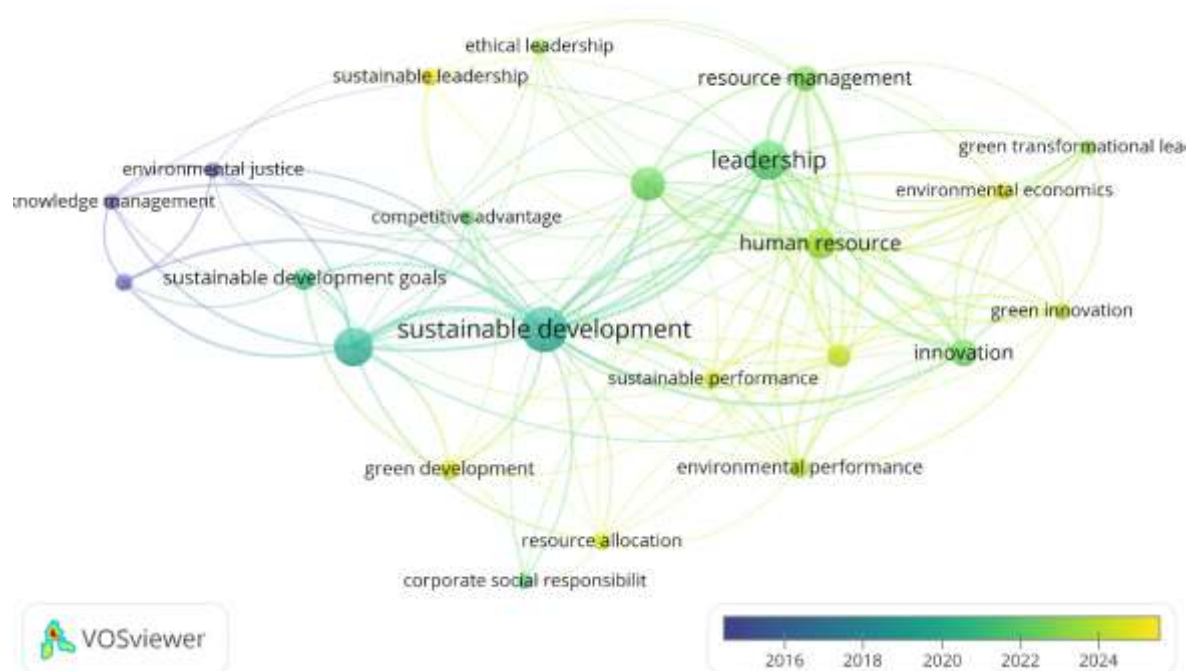


Figure 2. Overlay Visualization

Source: Data Analysis Result, 2025

The overlay visualization illustrates the temporal evolution of research linking leadership, sustainable HRM, and sustainable development, where keyword colors reflect their emergence over time. Earlier studies, represented in darker blue tones (around 2016–2018), focused on macro-level sustainability concepts such as *sustainable development*, *environmental justice*, *knowledge management*, and the *sustainable development goals*, demonstrating that the field initially emphasized global frameworks, social equity, and foundational sustainability principles. As the literature matured into the mid-period (2018–2021), indicated by green shades, research shifted toward organizational and managerial dimensions; keywords like *leadership*, *resource management*, *competitive advantage*, and *corporate social responsibility*

highlight a growing interest in how organizations integrate sustainability into HRM systems and leadership practices.

The most recent topics, shown in bright yellow (2022–2024), reveal a decisive turn toward innovation-driven sustainability, as seen in *green innovation*, *environmental economics*, *green transformational leadership*, and *sustainable performance*. This pattern indicates that contemporary scholarship is increasingly concerned with leadership's role in driving green innovation, improving environmental performance, and enhancing sustainable competitive advantage. Overall, the map shows a progression from broad sustainability discourse toward sophisticated, leadership-centered, and performance-oriented frameworks in sustainable HRM research.

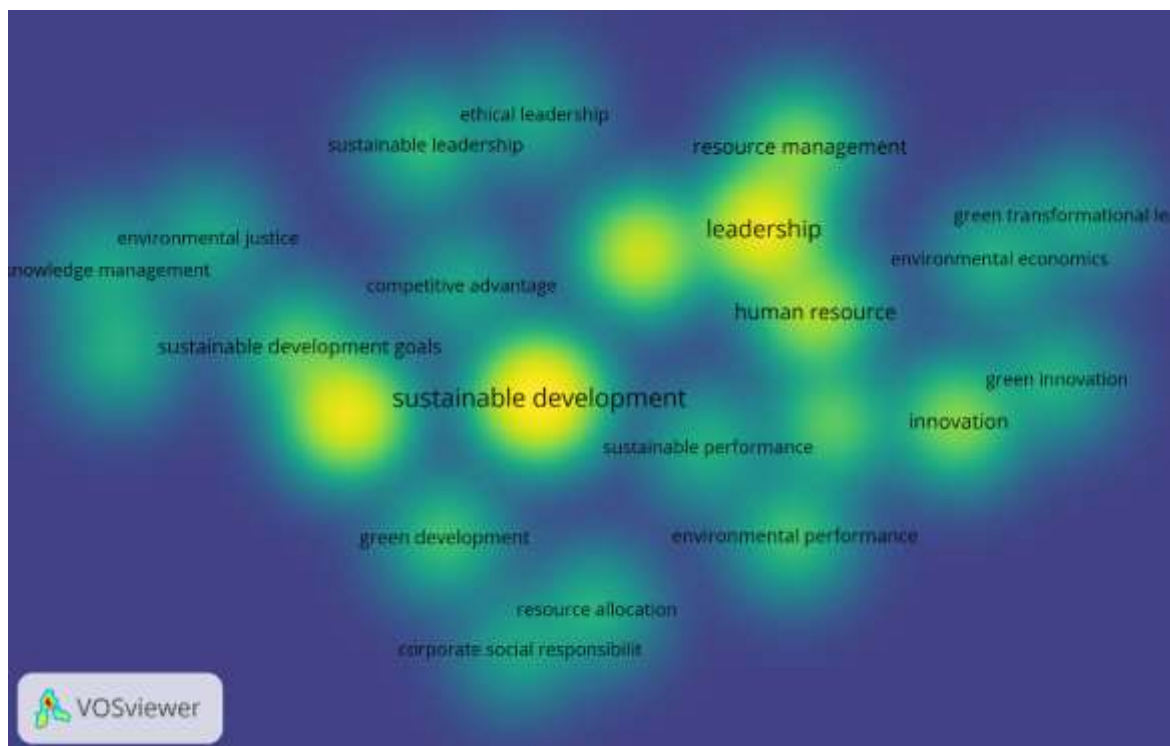


Figure 3. Density Visualization

Source: Data Analysis, 2025

The density visualization highlights the intensity of research activity within the domain of leadership and sustainable HRM by showing which keywords appear most frequently and which areas of the conceptual space are most developed. In this map, bright yellow areas represent high-density regions where keywords co-occur frequently across many publications, while green areas indicate moderate density, and blue/purple regions reflect low-density or emerging themes.

The brightest and most central hotspot is “sustainable development”, which appears as the core of the field. This suggests that sustainable development functions as the foundational concept linking diverse themes such as leadership, HRM, innovation, and environmental performance. Its central position and high density indicate that the majority of studies anchor their discussions in global sustainability frameworks, organizational sustainability goals, and performance outcomes related to sustainability.

Another major high-density region surrounds “leadership” and “human resource”, demonstrating that these two

themes act as the primary managerial and organizational lenses through which sustainable development is interpreted. The density around leadership-related terms especially *ethical leadership*, *sustainable leadership*, and *resource management* illustrates that scholars heavily focus on leadership behavior, capability building, and HRM strategies as drivers of organizational sustainability. These leadership concepts appear in bright green to yellow tones, showing their strong integration into the literature.

Moderate-density areas, such as those around “innovation,” “green innovation,” “environmental performance,” and “sustainable performance”, indicate the growing scholarly interest in linking leadership and HRM with innovation-driven sustainability outcomes. While not yet as dominant as sustainable development or leadership, these keywords form an important applied dimension of the field, highlighting research on how leadership strategies support environmental performance, innovation, and competitive advantage. Lower-density keywords such as

environmental justice, knowledge management, and corporate social responsibility—appear in darker green or blue areas. These represent specialized or emerging topics that contribute to the field but are not as frequently discussed

as the main clusters. They point to more specific research niches related to ethics, equity, organizational learning, and governance.

3.2 Co-Authorship Network

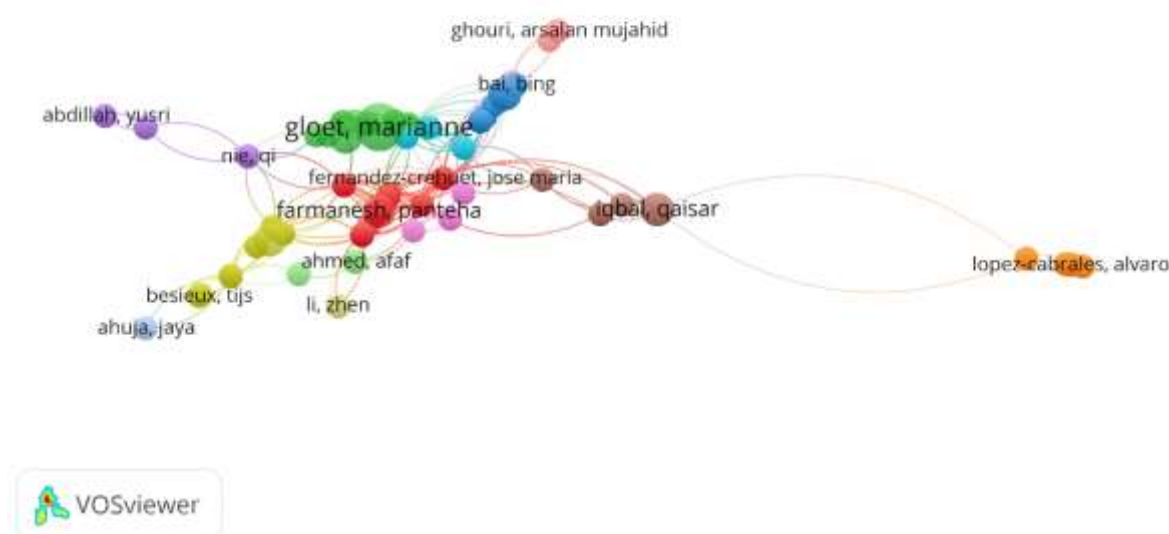


Figure 4. Author Collaboration Visualization

Source: Data Analysis, 2025

The co-authorship visualization illustrates the collaborative structure of research in sustainable HRM and leadership, revealing several interconnected clusters of scholars. At the center of the map is Gloet, Marianne, whose large node and dense network connections indicate her role as the most influential and collaborative author in this field. Her position demonstrates that she functions as a key intellectual hub, linking multiple research clusters through co-authored work with scholars such as Ahmed Afaf, Fernandez-Cruz Jose Maria, Nie Qi, Farmanesh Panteha, and Li Zhen.

Surrounding the central cluster are several semi-independent groups that reflect different thematic subareas. One prominent cluster consists of Iqbal Qaisar, Bai Bing, and Ghouri Arsalan Mujahid, suggesting a

collaborative focus on green innovation, leadership behavior, and sustainable performance. Another notable but more isolated cluster is led by Lopez-Cabral Alvaro, whose position on the far right indicates a specialized but less interconnected research stream, likely focused on strategic HRM and organizational capabilities. Smaller peripheral authors such as Abdillah Yusri, Besieux Tijs, and Ahuja Jaya appear in less central positions, showing emerging or niche contributions. Overall, the map reveals a partially centralized yet diversified research network, in which Gloet's collaborations anchor the field while other clusters reflect growing specialization and thematic expansion.

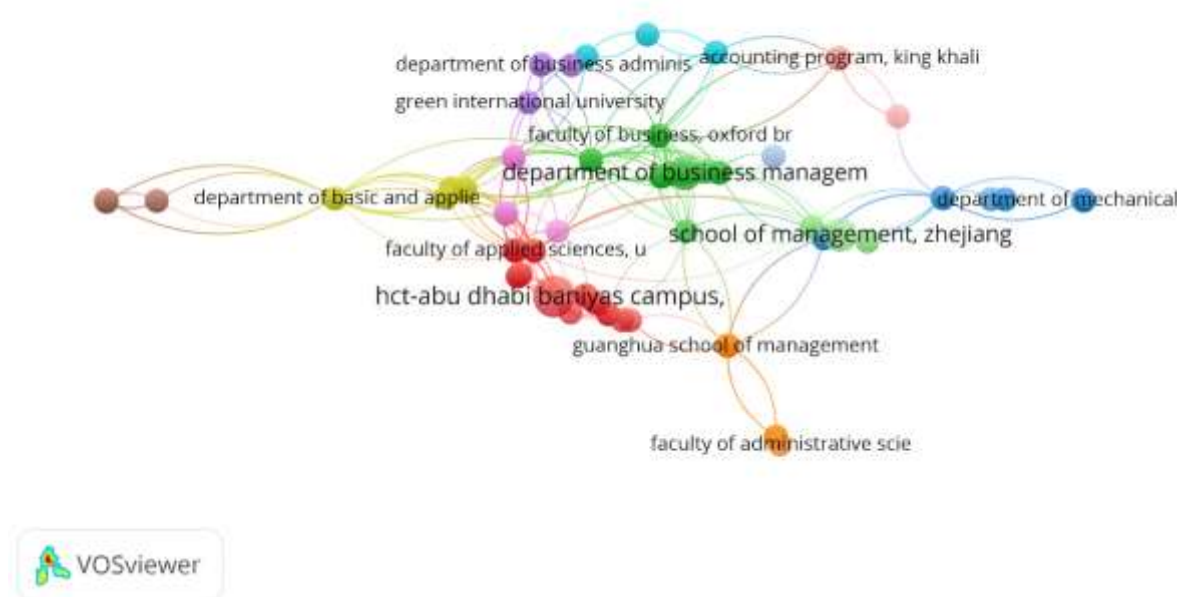


Figure 5. Affiliation Collaboration Visualization

Source: Data Analysis, 2025

The institutional co-authorship visualization displays the collaborative landscape among universities, faculties, and academic departments contributing to research on sustainable HRM and leadership. At the center of the network is the Department of Business Management, which appears as the most connected institutional node, indicating that it plays a pivotal role in facilitating multi-institutional research collaboration. This central position is reinforced by dense linkages to several key institutions, including the School of Management, Zhejiang, Guanghua School of Management, and various faculties of business and applied sciences. Surrounding the core cluster are multiple secondary groups, such as the HCT–Abu Dhabi Baniyas Campus, which forms a tightly knit red cluster connected to faculties of applied sciences and administrative sciences,

suggesting strong internal regional collaboration.

On the right side, the Department of Mechanical Engineering stands out as an independent cluster with lighter connections to management-focused institutions, indicating some interdisciplinary contributions but limited integration into the mainstream management research network. Meanwhile, smaller nodes like the Department of Basic and Applied Sciences and Green International University appear on the periphery, reflecting emerging or lower-frequency contributions. Overall, the visualization reveals a moderately centralized collaboration structure dominated by business and management schools, with several peripheral institutions contributing specialized or interdisciplinary insights into sustainability-related leadership and HRM scholarship.

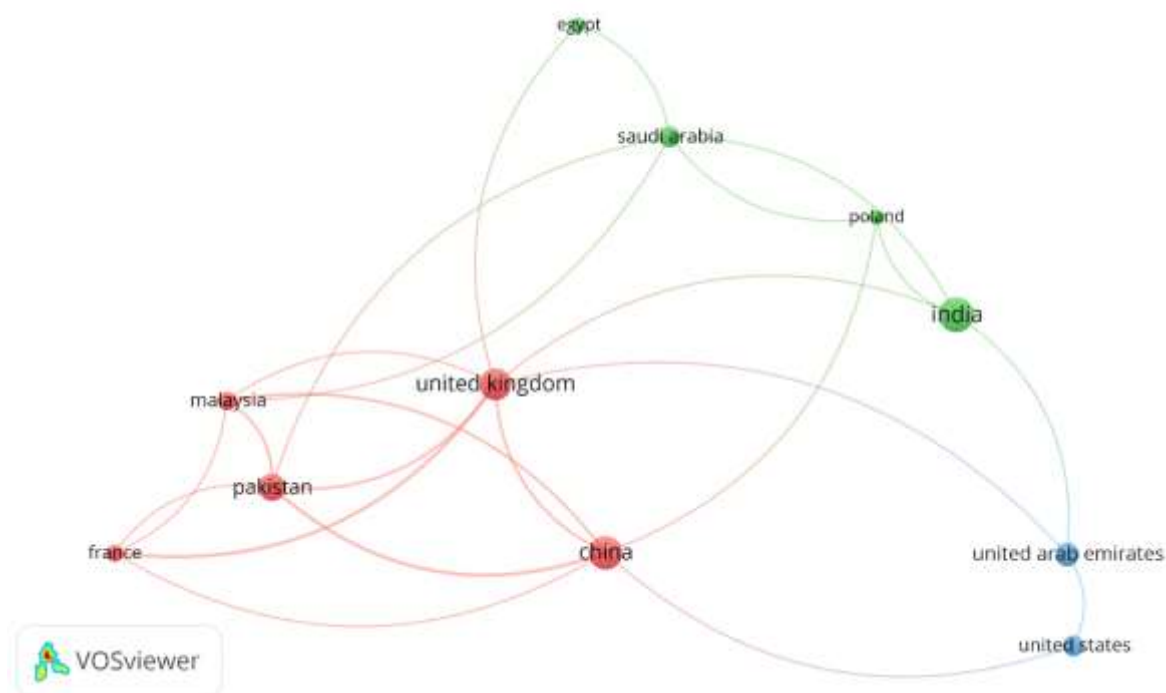


Figure 6. Country Collaboration Visualization

Source: Data Analysis, 2025

The country co-authorship visualization highlights the international collaboration patterns in research on sustainable HRM, leadership, and sustainability-related topics. At the center of the network is the United Kingdom, which appears as the most interconnected country and serves as a major global research hub linking diverse regions. Its strong co-authorship connections with China, Pakistan, Malaysia, France, and India indicate that the UK collaborates widely across Asia and Europe, fostering cross-regional knowledge exchange. China also emerges as a highly active contributor, positioned closely to the UK and exhibiting strong research ties with Pakistan and Malaysia, suggesting a vibrant Asian research cluster focused on sustainability and management studies.

On the right side, India forms another important collaborative node, maintaining strong links with Poland, Saudi Arabia, and

Egypt, which reflects emerging research partnerships within Asia–Middle East–Europe academic networks. Meanwhile, the United Arab Emirates and the United States occupy more peripheral but still meaningful positions, connected mainly through bilateral collaborations. The distribution and connectivity of clusters demonstrate that research in this field is driven by multi-regional collaboration, with the UK, China, and India acting as key anchors of global scientific exchange, while Middle Eastern and European countries contribute through targeted partnerships. Overall, the network reflects a dynamic and increasingly internationalized research landscape with several strong regional alliances.

3.3 Citation Analysis

The bibliometric data above identifies the ten most significant articles in the domain of Fear of.

Table 1. Top Cited Research

Citations	Authors and year	Title
693	Roscoe, S., Subramanian, N., Jabbour, C.J.C., Chong, T. (2019) [7]	Green human resource management and the enablers of green organisational culture: Enhancing a firm's environmental performance for sustainable development
289	Darvishmotevali, M., Altinay, L. (2022) [8]	Green HRM, environmental awareness and green behaviors: The moderating role of servant leadership
218	Islam, T., Khan, M.M., Ahmed, I., Mahmood, K. (2021) [9]	Promoting in-role and extra-role green behavior through ethical leadership: mediating role of green HRM and moderating role of individual green values
181	Mukhuty, S., Upadhyay, A., Rothwell, H. (2022) [10]	Strategic sustainable development of Industry 4.0 through the lens of social responsibility: The role of human resource practices
111	Iqbal, Q., Piwovar-Sulej, K. (2022) [11]	Sustainable leadership in higher education institutions: social innovation as a mechanism
99	Gloet, M. (2006) [12]	Knowledge management and the links to HRM: Developing leadership and management capabilities to support sustainability
94	Holbeche, L.S. (2018) [13]	Organisational effectiveness and agility
90	A. West, M., Lyubovnikova, J., Eckert, R., Denis, J.-L. (2014) [14]	Collective leadership for cultures of high quality health care
83	Zhao, W., Huang, L. (2022) [15]	The impact of green transformational leadership, green HRM, green innovation and organizational support on the sustainable business performance: evidence from China
73	Camuffo, A., De Stefano, F., Paolino, C. (2017) [16]	Safety Reloaded: Lean Operations and High Involvement Work Practices for Sustainable Workplaces

Source: Scopus, 2025

The citation table highlights the most influential publications at the intersection of sustainable HRM, green leadership, and organizational sustainability, demonstrating how the field has evolved from foundational HRM knowledge management perspectives toward contemporary green leadership and Industry 4.0 sustainability strategies. The most cited article *Roscoe et al.* [7] with 693 citations shows that green HRM and green organizational culture are core pillars for achieving superior environmental performance, reinforcing that HR practices play a central role in shaping sustainability outcomes. Subsequent highly cited studies, such as *Darvishmotevali & Altinay* [8] and *Islam*

et al. [9], further position leadership as a critical enabler of green behavior through frameworks like servant leadership and ethical leadership, emphasizing the importance of leadership style in influencing employees' environmental awareness and green behaviors. Other works, such as *Mukhuty et al.* [10], extend the conversation to Industry 4.0 and social responsibility, showing how sustainable HRM supports technological transitions.

Studies like *Iqbal & Piwovar-Sulej* [11] highlight sustainable leadership in higher education and its link to social innovation, illustrating the field's expansion beyond corporate contexts. Classic contributions like

Gloet [12] reveal that the intellectual roots of the field lie in knowledge management and capability development, which laid the groundwork for integrating sustainability into HRM. Publications on organizational agility, collective leadership, and sustainable performance [13]–[15] demonstrate how contemporary research merges operational excellence, leadership systems, and innovation to create resilient and sustainable workplaces. Finally, Camuffo *et al.* [16] contribute a practical lens by linking lean operations and high-involvement work practices to workplace sustainability and safety. Collectively, these highly cited works show that sustainable HRM research is anchored in leadership behavior, employee engagement, organizational culture, innovation, and the strategic integration of sustainability across HR functions and operational systems.

Discussion

The findings of this bibliometric study reveal a rapidly evolving and increasingly interconnected research domain situated at the intersection of leadership development, sustainable human resource management (HRM), and organizational sustainability. Thematic and temporal analyses demonstrate that the field has progressed from early discussions centered on sustainable development frameworks toward more applied and leadership-driven research focused on organizational performance, innovation, and green behavioral outcomes. The evolution of keywords such as *sustainable development*, *green HRM*, *ethical leadership*, *green transformational leadership*, and *sustainable performance* highlights a maturing research landscape in which leadership is no longer seen merely as a managerial function but as a strategic mechanism that enables environmental responsibility, social innovation, and long-term organizational resilience. Furthermore, the collaborative network analysis reveals strong author clusters and country collaborations, indicating a growing global interest in

sustainability-oriented leadership and HRM practices.

A prominent insight from the keyword co-occurrence network is the centrality of *sustainable development* and *leadership*, which function as intellectual anchors for the entire field. These two concepts consistently appear in the densest parts of the network, reflecting their widespread influence across different research themes. Leadership, in particular, is closely linked with *green HRM*, *innovation*, *organizational performance*, and *environmental management*, suggesting that scholars increasingly recognize the importance of leadership behaviors—such as ethical, servant, and transformational leadership—in shaping sustainability practices at the individual and organizational levels. The presence of *green innovation* and *environmental performance* as recent research hotspots indicates a shift toward examining how leaders enable organizations to develop innovative solutions, reduce environmental impact, and achieve sustainable competitive advantage.

The overlay visualization further demonstrates that research has evolved in distinct phases. Early works (2016–2018) focused heavily on broad sustainability concepts and justice-based themes, reflecting foundational explorations of sustainability principles. The mid-period (2018–2021) illustrates a shift toward organizational and HR-focused topics, including leadership development, HRM systems, corporate social responsibility (CSR), and resource management. This phase marks the emergence of sustainable HRM as a formalized research area. The most recent works (2022–2024) highlight leadership's strategic role in innovation, environmental economics, and sustainable performance. This transition signals a broader recognition that leadership development must include sustainability competencies if organizations are to respond effectively to global environmental and social challenges. Thus, the temporal patterns clearly indicate a shift from descriptive sustainability discourse toward more applied, strategic, and

performance-oriented sustainability research grounded in leadership theory.

The co-authorship networks reveal a moderately centralized yet diverse collaboration landscape. Scholars such as *Marianne Gloet*, *Jose Maria Fernandez-Cruz*, *Panteha Farmanesh*, and *Qi Nie* form central hubs that connect multiple research clusters, indicating their substantial intellectual influence. These researchers appear to anchor foundational discussions on knowledge management, sustainable HRM, and leadership development. Emerging clusters around authors like *Qaisar Iqbal* and *Bing Bai* suggest newer research directions focused on green transformational leadership and innovation in Asian contexts. Country-level collaboration patterns show that the United Kingdom, China, and India function as major international research hubs, forming strong partnerships with both Western and Asian countries. Meanwhile, Middle Eastern and Eastern European countries demonstrate rising participation in sustainability-oriented HRM research, indicating the field's expanding global footprint.

The institutional network also reflects significant collaboration within business schools and management departments, indicating that research on leadership and sustainable HRM is anchored primarily within management-related disciplines. However, the presence of engineering and applied sciences departments suggests a growing interdisciplinary engagement, especially in studies involving innovation, environmental performance, and Industry 4.0 technologies. This interdisciplinary trend is likely to strengthen in the future as organizations intensify their sustainability efforts using digital technologies, data analytics, and green innovations.

The results offer several important practical implications for organizations, policymakers, and leadership development practitioners. First, the centrality of leadership in driving sustainable HRM practices shows that organizations must intentionally integrate sustainability competencies into their leadership development programs. Ethical judgment, ecological literacy, systems

thinking, and green innovation capabilities should become essential components of leadership curricula. Secondly, the growing evidence linking green HRM such as green recruitment, green training, and green performance management to employee green behaviors suggests that HR professionals must redesign HR practices to align with sustainability goals. This includes embedding environmental criteria into job descriptions, performance appraisals, and reward systems. Third, organizations should foster a green organizational culture, as highlighted by highly cited works such as Roscoe et al. [7], which emphasize that culture acts as an enabler of environmental performance. Lastly, policymakers and higher education institutions can leverage insights from the bibliometric patterns to promote leadership programs that prioritize sustainability competencies, social innovation, and ethical conduct, particularly in settings where sustainability challenges are most acute.

This study contributes to the theoretical landscape in several ways. First, the bibliometric findings demonstrate that sustainable HRM and leadership research is increasingly converging toward an integrated conceptual model where leadership style, HR practices, and organizational sustainability form a mutually reinforcing system. Emerging leadership theories such as green transformational leadership, servant leadership, and ethical leadership—offer theoretical mechanisms for understanding how leaders influence sustainability outcomes. Second, the evolution of research themes suggests that sustainable HRM is transitioning from being an extension of traditional HRM theory to becoming a distinct theoretical domain rooted in sustainability science. Third, the strong linkages between leadership and green innovation underscore the theoretical relevance of combining innovation theory with leadership studies, highlighting how leaders shape environmental creativity and technological transformation. Finally, the global co-authorship patterns suggest that sustainability-oriented leadership theory is becoming increasingly internationalized,

encouraging cross-cultural theoretical extensions and comparative research.

4. CONCLUSION

This bibliometric study reveals that research on leadership development within sustainable HRM has evolved into a dynamic and multidisciplinary field, anchored by the central themes of sustainable development, leadership behavior, and green HRM practices. The findings show a clear progression from early conceptual discussions of sustainability toward more applied, innovation-driven, and performance-oriented research, emphasizing the strategic role leaders play in shaping environmental

responsibility and organizational resilience. Leadership styles such as ethical, servant, and green transformational leadership emerge as key mechanisms that influence employee green behavior, sustainable performance, and organizational innovation capacity. Co-authorship, institutional, and country collaboration analyses indicate strong global engagement, with the United Kingdom, China, and India acting as major knowledge hubs. Overall, the study underscores the importance of integrating sustainability competencies into leadership development and HR systems, encourages interdisciplinary collaboration, and highlights the need for continued exploration of leadership's role in advancing sustainable organizational futures.

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