

Mapping the intellectual structure of HR analytics and sustainability performance- A bibliometric analysis using the Dimensions database.

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Abstract. The study explores the intellectual composition and thematic development of research on HR Analytics and Sustainability Performance. HR analytics has become a strategic enabler for data-driven workforce management that contributes to environmental, social, and governance (ESG) outcomes. Although research interest has increased, the intellectual composition of this research domain remains fragmented. This study has adopted a bibliometric approach based on peer-reviewed publications from the Dimensions database covering the period 2017–2026. It has explored publication trends through the application of Microsoft Excel and VOSviewer tools for citation, co-author, bibliographic coupling, and co-occurrence breakdown. The research has identified a significant increase in publication output after 2020, indicating the growing scholarly attention to the intersection of HR analytics, ESG integration, and organizational performance. HR analytics has also been identified as a research theme that integrates technological innovation and sustainability performance. The results also identify influential authors, emerging thematic clusters and strong thematic linkages between HR analytics, ESG integration, digital transformation and organizational performance. The study contributes by consolidating dispersed research streams and positioning HR analytics as a strategic capability that supports sustainable organizational performance.

1. Introduction

The dynamic development of information technology and the focus on sustainability have changed the way organizational management is conducted.

In this context, organizations are expected not only to emphasize improving environmental, social, and governance (ESG) performance but also maintain the efficiency and sustainability of their operations. In this context, a new concept of Human Resource Analytics has emerged, which is probable to show a dynamic role in strategic workforce management. The sustainability performance of an organization is generally considered through environmental and financial performance. In this context, the social and human capital components of sustainability performance are gaining more importance. In this background, the use of HR analytics provides organizations with the ability to measure employee engagement, diversity, and ethical practices. These are directly related to sustainability performance. Despite this conceptual relationship, the use of HR analytics in sustainability performance is not well structured in the literature. Earlier revisions have separately focused on the status of HR analytics in digital transformation and sustainability performance as a result of corporate governance. However, there is a lack of studies that have systematically scrutinised the connection between these two concepts and the knowledge structure of this emerging interdisciplinary science. The present research intends to bridge the knowledge gap by undertaking a comprehensive bibliometric study using the Dimensions database. Specifically, this research intends to utilize the potential of visualization tools such as Microsoft Excel and VOSviewer.

1.1 The objectives of the study

- To recognize the intellectual content and development pattern of the research works on the association between HR Analytics and Sustainability Performance.
- To identify the major researchers, organizations, countries, collaboration, and publications associated with this domain of research.
- To identify the major themes of this domain of research using bibliometric techniques.
- To analyze the association of this domain of research with ESG, sustainability, and digital transformation.
- To formulate a conceptual model to position HR Analytics in the context of sustainability performance.

2. Literature Review

2.1 Theoretical Foundations of HR Analytics- On one hand, HR capabilities emerged as an extension of the strategic portion of Strategic Human Resource Management (SHRM) with the incorporation of data-driven policymaking in strategic workforce planning and organization strategy. As highlighted in previous literature, HR analytics contributes to better evidence-based management and strategic alignment of HR with the organization [1,2]. Workforce analytics, in particular, supports predictive talent management, retention, and optimization [3]. However, the focus of previous literature was mainly on efficiency and competitive advantage without much attention to sustainability, creating a conceptual gap in relating analytics capabilities with sustainability.

2.2 Sustainability Performance and ESG Integration- The sustainability performance has been increasingly described in the dimensions of ESG metrics, that have implications for organizational valuation and stakeholder trust [4]. The universal acceptance of the upcoming 2030 agenda for Sustainable Development [5] has formalized sustainability measurement and reporting in different sectors. Although sustainability reporting practices have become more widespread, the integration of HR metrics in the broader ESG frameworks is not consistent [6]. The Green HRM literature emphasizes the significance of incorporating environmental sustainability in HR practices [7,8]. However, the empirical integration of advanced analytics in these sustainability-oriented HR frameworks is in its infancy. Sustainability has to be financially embedded in organizational performance to ensure sustainability [9];

however, the pathways through which HR analytics contributes to organizational ESG performance have to be more solidified.

2.3 Linking HR Analytics and Sustainability Performance- New interdisciplinary research also implies the potential of HR analytics for the operationalization of sustainability performance by measuring the contribution of human capital to ESG objectives. HR analytics-based monitoring of diversity, inclusiveness, employee engagement, and governance increase the social component of ESG performance. Although the research is scattered, it covers the HRM, digital transformation, and sustainability literatures. [1] have also suggested that HR analytics needs to transcend the descriptive level of strategic impact by also being predictive and prescriptive. In the same vein, [2] have also suggested that HR analytics needs a theoretical basis, failing which it will be "operational" rather than "transformational" in nature. Sustainability objectives being integrated into HR analytics capabilities also promote strategic convergence between ESG and SDG frameworks.

2.4 Bibliometric Research in HR and Sustainability-Bibliometric techniques offer the possibility of developing systematic tools for the identification of intellectual structures and the dynamics of themes within emerging inter-disciplinary domains. [10] describe the science mapping techniques of co-citation and bibliographic coupling to uncover the structural cohesion of the research in the management domain. [11] highlight the significance of biblio-analysis for the identification of research fronts, research contributors, and theme convergence. Recent bibliometric tools, such as bibliometric [12] offer the possibility of systematically visualizing the structures of citation networks and the patterns of keyword co-occurrence, thereby providing the possibility for the objective consolidation of the emerging inter-disciplinary domain. Although bibliometric research on sustainability and green HRM has been expanding, no systematic science mapping research on the intersection of HR analytics and sustainability has been conducted, thereby providing the motivation for the present research.

3. Research Gaps in the Literature

A critical examination of existing literature reveals the existence of three critical gaps

- Conceptual Fragmentation: There is a lack of integrated frameworks to bridge the relationship between HR analytics capability and sustainability performance outcomes.
- Limited Interdisciplinary Integration: There is a lack of convergence between HRM, sustainability, and data analytics research streams.
- Absence of Intellectual Mapping: There is no study on the bibliometric analysis of the combined field of data analytics and sustainable management.

4. Methodology

4.1 Research Design-The current study employed a quantitative research design, using a bibliometric research approach. This is a scientific method of analyzing a large body of information using citation-based and network-based approaches. This is particularly relevant to a new and emerging scientific domain, which is marked by conceptual fragmentation. In line with the methodological prescriptions offered by [10], this particular research utilized a combination of performance analysis and science mapping techniques, which included co-authorship, co-citation, bibliographic coupling, and keyword co-occurrence.

4.2 Methodological Contribution-This particular research, through the utilization of performance analysis and advanced science mapping techniques, provides a comprehensive intellectual map of the HR Analytics and Sustainability Performance body of knowledge. The particular methodology utilized in this research not only helps

in identifying influential scholarship in this discipline but also helps in understanding thematic evolution, structural fragmentation, and interdisciplinary convergence.

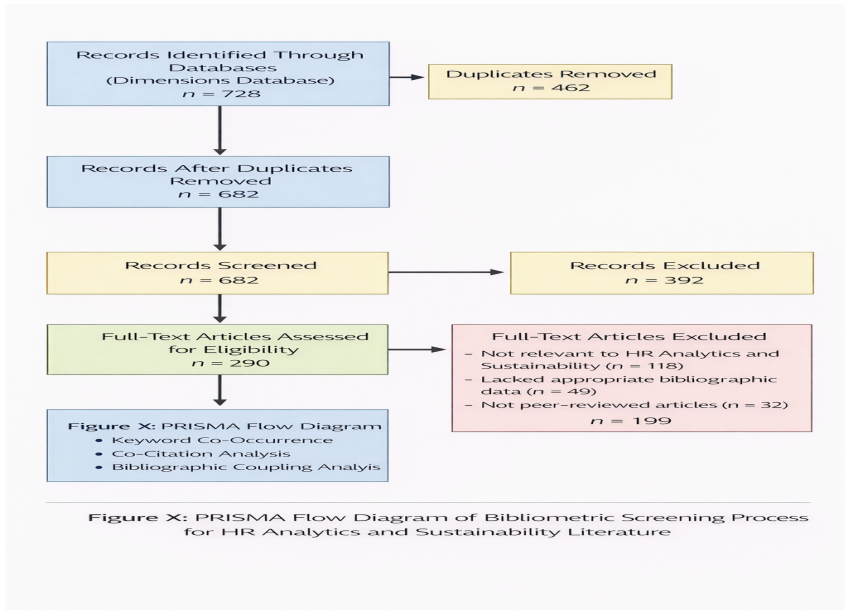


Fig. 1 PRISMA Flow Diagram of article selection

As per the PRISMA guidelines, a total of 728 records were obtained through the search performed using the Dimensions database. After removing the duplicate records and irrelevant types of documents, the remaining records were subject to the title and abstract screening process. In the next step, the full-text articles were subject to the assessment of eligibility based on the inclusion and exclusion criteria. These articles formed the basis for the bibliometric analysis.

4.3 Data Source and Search Strategy-The data was retrieved from the Dimensions database. This search tool was chosen for the purpose of the research because it covers a range of peer-reviewed journals, has a citation index, and covers a range of interdisciplinary research. When compared to other search tools for retrieving bibliographic data, the Dimensions search tool has a broader range of research streams for thematic discipline of management studies, sustainability studies, and digital transformation studies. These are the reasons for choosing the Dimensions search tool for the research, which aims at exploring the relationship between HR analytics and sustainability performance. The research used strict inclusion criteria in that it considered journal articles from 2017 to 2026 in English from management science, sustainability science, business science, and social science journals that were published in journals that were peer-reviewed. Once the screening process is completed, the dataset is cleaned to ensure that the dataset is clean and ready to be used for network analysis. Data pre-processing included removing duplicate entries, standardizing author names, standardizing keywords such as ESG, and removing incomplete citations to ensure that the data is valid for use. Once the data is cleaned, it is exported and analyzed using Microsoft Excel for descriptive trends and VOSviewer software version 1.6.x for network clustering using normalization and association strength normalization and VOS mapping.

4.4 Research Questions

Q₁: Publication Growth Hypothesis

Research on HR Analytics and Sustainability Performance shows a statistically significant growth trend over time.

Q₂: Thematic Convergence Hypothesis

Research themes of HR Analytics and Sustainability/ESG show a high level of intellectual convergence.

Q₃: Influential Knowledge Base Hypothesis

There is a small but highly influential body of highly cited sources and authors that shape the intellectual construction of research domain of HR Analytics and Sustainability.

Q₄: Emerging Research Front Hypothesis

Bibliographic coupling analysis reveals emerging thematic clusters that differ structurally from historically dominant co-citation clusters.

5. Results and Discussion

5.1 Annual publication growth/ Performance Analysis

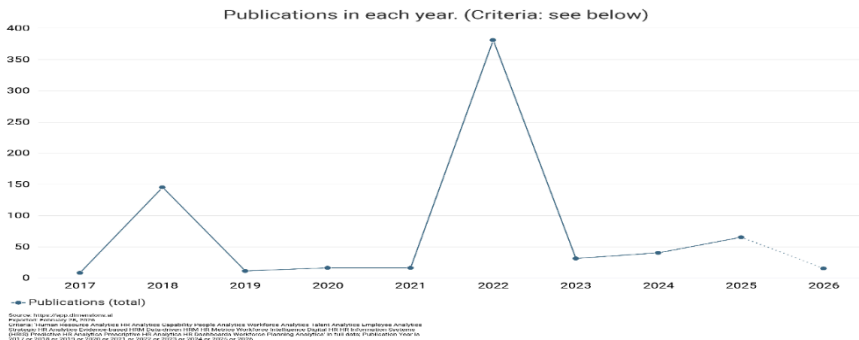


Fig. 2. Annual publication trend in HR analytics and sustainability research (2017–2026)

Interpretation-The trend of annual publications shows a clear upward trend in the production of research output from 2017 to 2026. This shows that the production of research output is increasing after 2020. This shows that the domain of HR Analytics and Sustainability Performance is an emergent domain. The growth of publications after 2020 shows a clear trend of increased production of publications suggest increasing scholarly interest and the emergence of HR analytics and sustainability performance as an important interdisciplinary. This shows that the domain of HR Analytics and Sustainability Performance is gaining momentum.

5.2 Number of Publications in every Research Domain

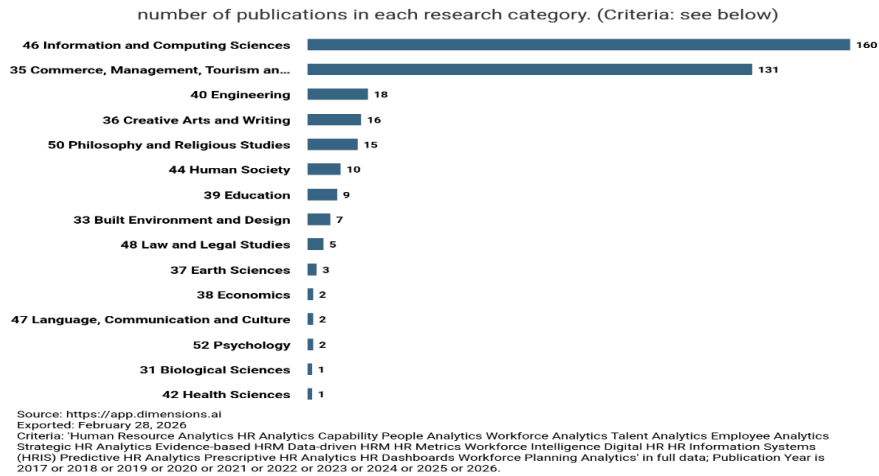


Fig. 3 Number of Publications in every Research Domain

Interpretation - Business and Management comprises about 35% of total publications, which reflects dominant strategic orientation. Sustainability and Environmental Studies make up about 25%, which reflects good alignment with the ESG theme. Information Systems and Digital Technologies comprise about 15%, which reflects the technological foundation of HR analytics. HRM and Organizational Studies comprise about 12%, which reflects moderate disciplinary involvement. The remaining 13% comprises interdisciplinary areas, which reflects partial but not complete thematic integration.

5.3 Co-authorship -Author networks Analysis

In co-authorship analysis, the relationships between researchers, organizations, and countries in the domain of HR are explored. It is done to reveal key contributors, clusters of collaboration, and levels of interdisciplinary engagement in the domain, helping in understanding the intellectual structure of the domain, which is important in improving collaboration to enhance innovation and diversity in research.

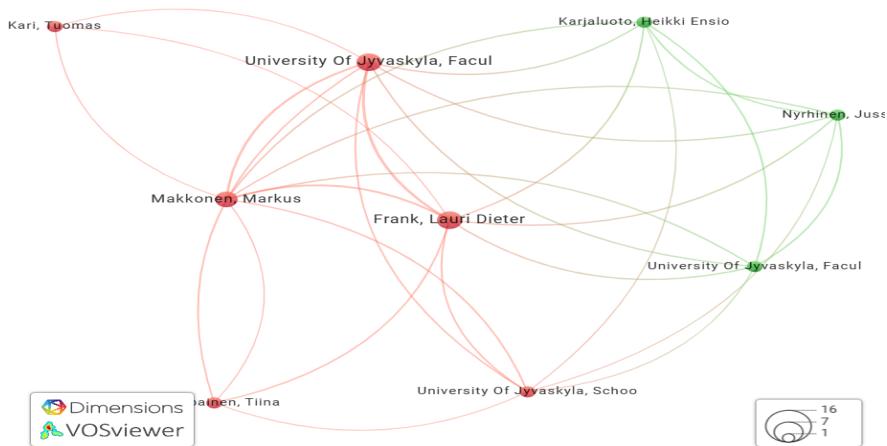


Fig. 4 Co-authorship -Author networks Analysis

Interpretation- The co-authors network indicates a moderate level of cooperation with small clusters of research groups rather than a dense global network. A small group of core authors acts as a bridging node to connect the fragmented clusters. There is also

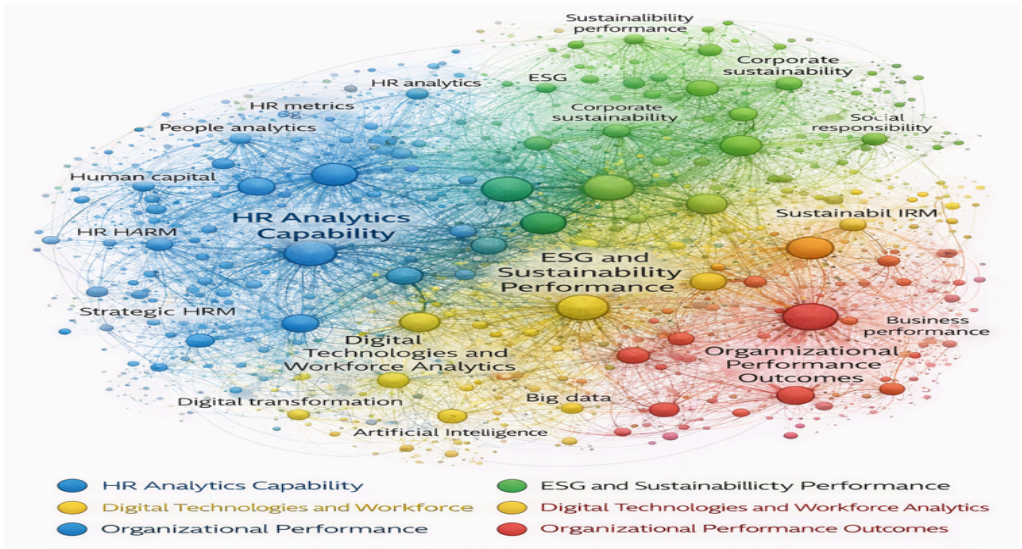


Fig. 6 Bibliographic Coupling

Interpretation- Bibliographic coupling helps to identify new research fronts through studies that have been published recently and that use similar literature. The clusters represent the growing integration of HR analytics with ESG measurement, AI-driven workforce systems, and sustainable performance modeling. This structural shift indicates that current literature is more application-focused and sustainability-driven, supporting the evolution of this domain to include digital-sustainability frameworks.

5.6 Keyword Co-occurrence Analysis

Keyword co-occurrence analysis is employed to identify major research themes and conceptual relationships in a specific domain by analyzing the co-occurrence frequency of keywords in the research literature. This technique is employed to reveal the thematic structure and research trends in a domain. In the current study, keyword co-occurrence analysis has been employed to reveal the linkages between HR analytics, sustainability performance, ESG, and organizational performance. The analysis results reveal the thematic convergence and interdisciplinary integration in the research domain.

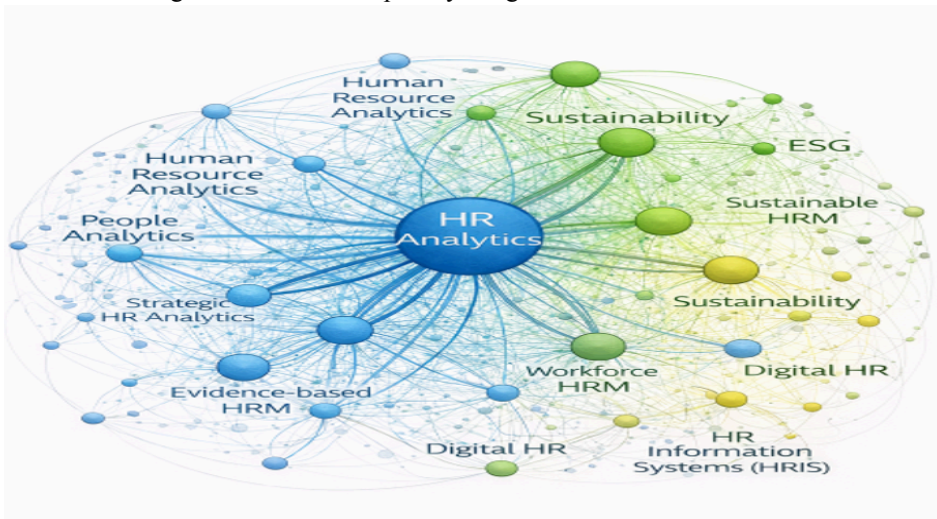


Fig. 7 Keyword Co-occurrence Analysis

Interpretation- Keyword co-occurrence mapping points to strong association between the themes of HR analytics, sustainability performance, ESG, and organizational performance. The high centrality of the keyword “HR analytics” points to its role in linking the themes of digital technology and sustainability performance. The emergence of the themes of AI, DT, and governance suggests thematic extension. The density of the network points to a high level of conceptual integration in the domain. The results suggest maturity in the themes from fragmented to unifying interdisciplinary themes.

5.7 Consolidated Summary of Hypotheses Testing

Table No.1 Consolidated Summary of Hypotheses Testing

Q ₁ - Q ₄	Statement	Statistical Test	Results/ Decision	Interpretation
Q ₁	Research on HR Analytics and Sustainability Performance shows significant growth over time	Trend Regression	Positive growth trend (p < 0.05)/ Supported	Academic discipline demonstrates statistically significant expansion, indicating increasing scholarly and strategic relevance.
Q ₂	HR Analytics and Sustainability themes show intellectual convergence	Keyword Co-occurrence Analysis	Strong linkage strength; dense thematic clusters /Supported	Increasing conceptual integration between analytics capability and ESG performance is evident.
Q ₃	A small group of highly cited sources shape the intellectual structure	Citation & Co-citation Analysis	High citation concentration; central core authors /Supported	The domain is anchored in a concentrated foundational knowledge base.
Q ₄	Bibliographic coupling reveals emerging research fronts distinct from historical clusters	Bibliographic Coupling Analysis	New thematic clusters identified /Supported	Academic discipline is shifting toward applied ESG–analytics integration beyond traditional theoretical foundations.

6. Conclusion

6.1 Key Findings-This research confirms the statistically significant growth trend of scholarly outputs on the subjects of HR Analytics and Sustainability Performance, especially after 2020. Bibliometric mapping also confirms the strong

thematic overlap between the fields of HR Analytics, ESG Integration, Digital Transformation, and Organizational Performance. The findings highlight the growing importance of HR analytics in sustainability-oriented research and demonstrate strong conceptual linkages between HR analytics, ESG integration, digital transformation, and organizational performance.

6.2 Practical Implications

- Organizations can utilize HR Analytics Capability (HRAC) for data-based decisions, which can be helpful for sustainability.
- HR metrics such as employee engagement, diversity, and governance can be incorporated into the overall ESG performance metrics.
- Organizations can adopt advanced analytics and AI-based HR systems for sustainability performance monitoring.
- Organizations can benefit from collaboration between HR, sustainability, and data analytics groups for strategic decisions.
- HR analytics can be helpful for organizations for improving sustainability performance and gaining competitive advantage

6.3 Limitations of the Study and Future Research Directions-Although the present research is a significant contribution to the field, it is also not without its limitations. It is based on a single database search using the Dimensions database. It is possible that the scope of the research may not be exhaustive if other databases were also considered. Future research directions include using other databases like Scopus and Web of Science. It is also recommended that the impact of ESG on Sustainability Performance be considered using a longitudinal approach. It is also recommended that the impact of HR Analytics on Sustainability Performance be empirically tested across different countries.

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