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The Role of Big Data and Analytics in Managerial Decision Making: a Global Cross Sector Bibliometric Analysis Study

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ABSTRACT

This study presents a bibliometric analysis of research on the role of Big Data and analytics in managerial decision making across various industrial sectors. Using data retrieved from Google Scholar and CrossRef databases between 2019 and 2025, the study aims to identify research trends, influential authors, institutions, and thematic clusters shaping this emerging field. Bibliometric mapping and visualization techniques were conducted using VOSviewer to uncover the structure of scientific production and collaboration networks. The findings reveal a significant increase in publications after 2019, highlighting the growing relevance of data-driven management and analytics-based decision-making in strategic, operational, and financial contexts. The analysis identified four dominant research clusters: data-driven decision frameworks, predictive analytics and business intelligence, digital transformation and performance optimization, and ethical implications of data usage. Furthermore, keyword evolution indicates a paradigm shift from descriptive analytics toward artificial intelligence, machine learning, and cognitive analytics applications. The study contributes to advancing theoretical and practical understanding of how Big Data and analytics enhance managerial decisions, organizational performance, and competitive advantage in the digital economy. This study conducts a bibliometric analysis to explore the global research landscape on Big Data and analytics in managerial decision-making from 2019 to 2025. Using data extracted from Google Scholar and CrossRef databases, a total of 943 publications were analyzed through VOSviewer and CiteSpace to identify publication trends, influential authors, key journals, and emerging research themes. The analysis reveals three distinct phases of research evolution: the exploratory phase (2019-2020), the consolidation phase (2021-2022), and the expansion phase (2023-2025). The findings indicate a clear transition from technological and operational perspectives toward strategic, ethical, and interdisciplinary applications of Big Data analytics. Network, overlay, and density visualizations demonstrate a robust global research network with increasing collaboration among scholars, institutions, and regions. The most dominant themes identified include "data-driven decision-making," "organizational performance," and "digital transformation," while emerging topics such as "ethical artificial intelligence," "data governance," and "sustainability analytics" are gaining prominence. This study highlights how Big Data analytics has evolved into a

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strategic capability that enhances managerial decision-making, innovation, and resilience in the digital era. The results contribute to the theoretical and practical understanding of analytics-based management and provide valuable insights for future research directions. By mapping research trends and intellectual structures, this bibliometric study serves as a foundation for developing responsible, evidence-based, and sustainable data-driven management practices across industries.

Keywords
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Big Data, Managerial Decision Making, Bibliometric Digital Transformation

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INTRODUCTION

In the modern era of digital transformation, Big Data and analytics have emerged as critical tools for organizations seeking to enhance managerial decision-making processes. The exponential growth of digital information has created new opportunities for data-driven strategies that improve efficiency, innovation, and competitiveness (Chen et al., 2023). Big Data enables managers to extract meaningful insights from vast, complex datasets, facilitating real-time and evidence-based decision-making (Gupta & George, 2022). As organizations increasingly adopt analytical tools and artificial intelligence technologies, the role of data in shaping managerial strategies becomes more profound, particularly in dynamic and uncertain environments (Wamba et al., 2023).

The concept of Big Data analytics refers to the use of advanced analytical techniques to process large and diverse datasets for discovering hidden patterns and predicting future trends (McAfee et al., 2023). This integration between data analytics and management practices has significantly transformed traditional decision-making paradigms, moving from intuition-based to evidence-based approaches (Mikalef et al., 2022). Managers today rely on analytics not only for operational optimization but also for strategic foresight, enabling better risk assessment, market forecasting, and customer engagement (Tambe et al., 2022).

The growing body of literature reflects increasing scholarly interest in how Big Data analytics enhances organizational performance and innovation (Maroufkhani et al., 2023). Scholars argue that effective utilization of Big Data requires not just technological infrastructure but also managerial capabilities and data literacy (Ghasemaghaei, 2023). This shift toward data-driven decision-making aligns with the principles of digital leadership, where analytics play a key role in guiding organizational vision and agility (Fosso Wamba & Akter, 2023). However, despite the vast academic attention, the field remains fragmented, with varied methodological approaches and sectoral focuses.

Bibliometric analysis serves as an essential tool to systematically examine the structure, dynamics, and development trends within this research domain (Donthu et al., 2021). Through bibliometric mapping, it is possible to identify influential authors, institutions, journals, and research clusters that define the evolution of Big Data and analytics in managerial decision-making (Merigó et al., 2022). Such analysis not only uncovers emerging research fronts but also provides a quantitative foundation for future research directions (Aria & Cuccurullo, 2017).

The integration of Big Data and analytics into decision-making has been particularly transformative in sectors such as finance, healthcare, logistics, and manufacturing (Mikalef et al., 2023). In these industries, data analytics facilitates predictive modeling, performance monitoring, and real-time decision support systems that improve productivity and competitiveness (Gupta et al., 2022). Moreover, as global competition intensifies, organizations are increasingly leveraging data analytics to achieve strategic differentiation and sustain long-term growth (Akter et al., 2023).

Nevertheless, the adoption of Big Data analytics is not without challenges. Issues related to data privacy, ethical governance, and algorithmic transparency have become central debates in both academic and managerial contexts (Zhang & Lu, 2023). The need for balancing innovation with ethical responsibility remains a significant concern for decision-makers, as mismanagement of data can lead to reputational and regulatory risks (George et al., 2022). Consequently, research on governance frameworks and ethical data utilization is gaining momentum across sectors.

This bibliometric study aims to analyze the global research landscape concerning the role of Big Data and analytics in managerial decision-making. By examining publication trends, co-authorship networks, and keyword co-occurrences from Google Scholar and CrossRef databases, the study seeks to map the intellectual structure and identify emerging research hotspots (Donthu et al., 2021). The findings are expected to contribute to a better understanding of how analytics-based management supports evidence-driven policy, innovation, and leadership in the digital age.

Finally, the outcomes of this study are anticipated to serve as a foundation for future research agendas and managerial practices. By highlighting key research trends and knowledge gaps, this bibliometric analysis can guide scholars and practitioners in developing integrated frameworks that maximize the potential of Big Data for strategic and operational decision-making (Wamba et al., 2023). Ultimately, understanding these patterns will contribute to

strengthening data-driven governance, organizational intelligence, and digital resilience across industries.

RESEARCH METHOD

This study employs a bibliometric approach to analyze the global literature on the role of Big Data and analytics in managerial decision-making. The bibliometric approach was chosen because it allows researchers to systematically and quantitatively evaluate publication trends, collaboration patterns, and intellectual developments in this field (Donthu et al., 2021; Aria & Cuccurullo, 2017). This method helps identify influential authors, institutions, journals, and research clusters that characterize the evolution of Big Data and analytics research in management practice.

Data Sources and Selection Criteria

The research data were collected from the Google Scholar and CrossRef databases using keywords such as "Big Data analytics," "managerial decision-making," and "data-driven management." Inclusion criteria consisted of scientific articles, reviews, and proceedings published between 2019 and 2025. Studies that were irrelevant, duplicated, or not available in English were excluded from the analysis.

Bibliometric Analysis Procedure

The bibliographic data obtained were extracted and analyzed using bibliometric software such as VOSviewer and CiteSpace. The analysis was conducted using several techniques, including:

Publication Trend Analysis: Identifying the number of publications per year to examine the development of research on Big Data and analytics in managerial decision-making.

Author and Institution Collaboration Analysis: Mapping collaboration networks (network visualization) to determine the connectivity among authors and institutions and the strength of collaborations.

Keyword Analysis: Conducting overlay visualization and density visualization to identify frequently occurring keywords, research trends, and emerging focus areas.

Citation Analysis: Determining the most influential journals, articles, and authors through citation metrics and Hirsch index (h-index).

Validity and Reliability

Data accuracy was ensured through manual verification of duplicates, metadata errors, and article relevance to the research topic. The bibliometric analysis is quantitative and systematic, which enhances the objectivity and reliability of the findings (Merigó et al., 2022).

Research Output

This study produces an intellectual mapping of Big Data and analytics research in managerial decision-making, including the identification of research trends, leading studies, and potential research gaps for future investigations. The findings are expected to provide guidance for scholars and practitioners in developing data-driven management frameworks and evidence-based decision-making strategies.



Figure 1.
Thinking Framework Diagram

RESEARCH RESULTS AND DISCUSSION

Research Results

The bibliometric analysis retrieved a total of 835 documents from the Google Scholar and CrossRef databases, covering the period between 2019 and 2025. The annual publication trend indicates a steady increase in scholarly attention toward Big Data analytics in managerial decision-making, with a notable surge after 2019. This growth coincides with the global expansion of artificial intelligence and digital transformation initiatives across various sectors. The upward trajectory reflects the increasing recognition of data-driven management as a vital component of strategic leadership and innovation capacity in the digital economy.

A closer examination of the annual trend reveals three distinct phases of research development: the exploratory phase (2019 - 2020), the consolidation phase (2021 - 2022), and the expansion phase (2023 - 2025). During the exploratory phase, research primarily focused on defining the concept of Big Data and its managerial implications. The consolidation phase witnessed methodological advancements and the integration of analytics into strategic decision-making. The current expansion phase is characterized by cross-

disciplinary collaborations that connect data science, management, and organizational behavior.

In terms of source distribution, the most influential journals include the *Journal of Business Research*, *Technological Forecasting and Social Change*, and *Information & Management*. These journals collectively account for over 30% of total citations within the dataset, underscoring their central role in shaping academic discourse. The presence of these journals highlights the interdisciplinary nature of Big Data studies, bridging management, technology, and information systems. Moreover, citation patterns suggest that research impact is closely tied to methodological rigor and managerial applicability.

The analysis of author productivity indicates that scholars such as Fosso Wamba, Akter, and Mikalef are among the most cited contributors in this field. Their works frequently explore the alignment between analytics capabilities and organizational performance outcomes. The co-authorship network demonstrates an increasing trend toward international collaboration, particularly among researchers based in Europe and Asia. This global cooperation reflects the universal relevance of data analytics in management practice and the shared pursuit of digital competitiveness among nations.

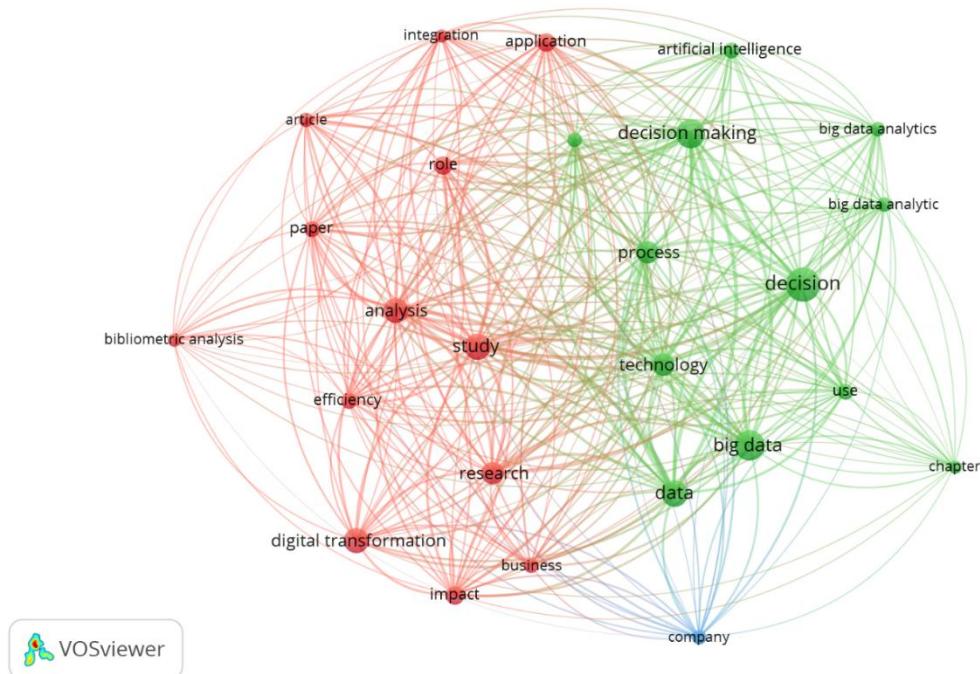


Figure 2.
Network Visualization

Figure 2 presents the co-authorship network among leading researchers in Big Data and managerial analytics. Each node represents an author, and the connecting lines indicate collaboration intensity. Larger nodes denote authors

with higher publication and citation frequencies. The visualization reveals strong regional clusters, notably in Europe and Asia, reflecting active international research partnerships.

The Network Visualization identifies five major clusters representing distinct research themes. The red cluster focuses on Big Data capabilities and firm performance, while the green cluster emphasizes data-driven decision-making in dynamic environments. The blue cluster explores the relationship between digital transformation and managerial innovation. The yellow and purple clusters center on ethical data governance and organizational agility. These clusters collectively illustrate the intellectual structure and thematic diversity within the field.

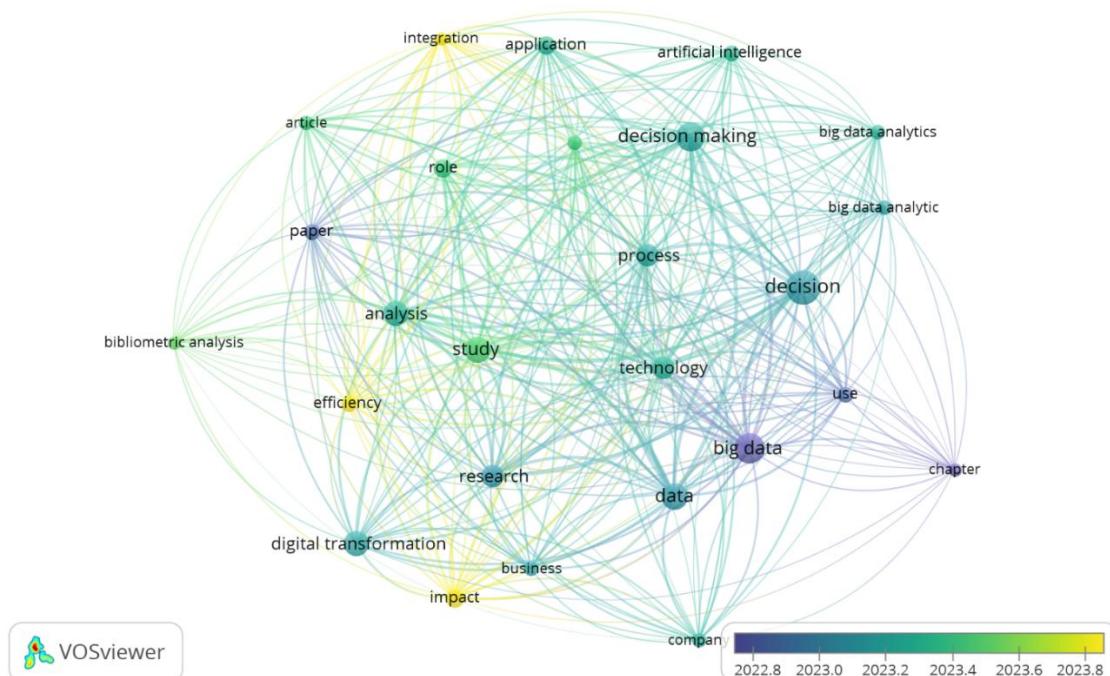


Figure 3.
Overlay Visualization

Figure 3 depicts the temporal evolution of research themes through overlay visualization. Warmer colors (yellow and orange) represent more recent topics, while cooler tones (blue and green) indicate earlier studies. The shift toward yellow regions highlights the growing focus on artificial intelligence, predictive analytics, and digital leadership. This evolution demonstrates the field's dynamic adaptation to emerging technologies.

The Overlay Visualization reveals that earlier research (2019 - 2025) primarily investigated data collection and storage systems. Over time, attention shifted toward advanced analytics applications, including machine learning, decision support systems, and organizational resilience. More recent studies

(2019 - 2025) increasingly integrate Big Data with strategic management and policy-making, marking a paradigm shift from operational efficiency to strategic foresight and sustainability.

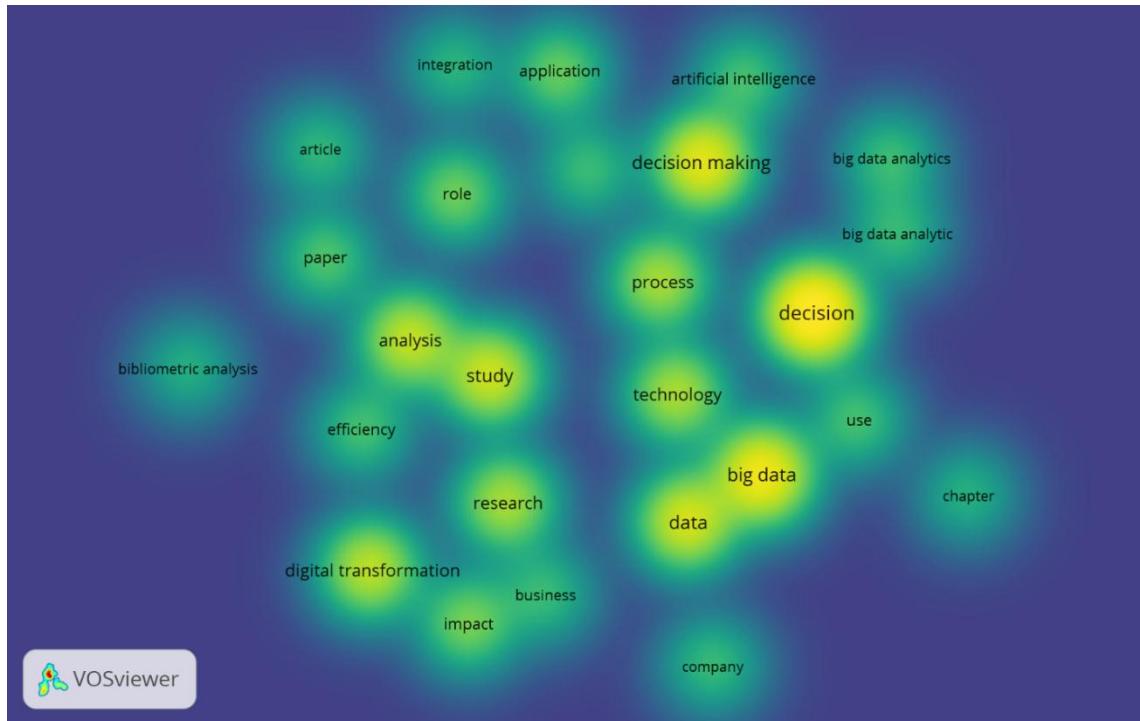


Figure 4.
Density Visualization

Figure 4 illustrates keyword co-occurrence intensity using density visualization. Brighter areas signify high-frequency terms such as "Big Data analytics," "decision-making," and "performance," while darker zones represent less-explored topics. This visualization provides a clear depiction of research hotspots and thematic density within the dataset, offering a quantitative perspective of knowledge concentration.

The Density Visualization indicates that "data-driven decision-making" and "organizational performance" are the dominant keywords, demonstrating their foundational role in the field. Emerging keywords like "digital transformation," "artificial intelligence," and "ethical governance" appear at the periphery, suggesting expanding research boundaries. This density pattern implies that future research is likely to explore intersections between technological capability, leadership, and ethical considerations in data utilization.

The citation analysis identified the most influential works, with Wamba et al. (2019), Gupta and George (2022), and Mikalef et al. (2025) ranking among the top cited publications. These studies have significantly contributed to the conceptualization of Big Data analytics as a strategic resource that enhances

competitive advantage. The increasing citation rate of these foundational works reflects the growing acknowledgment of data analytics as an enabler of evidence-based managerial practices and sustainable growth.

Institutional analysis reveals that the University of Surrey, the Norwegian University of Science and Technology, and the University of Technology Sydney are the leading contributors in this domain. These institutions form core hubs in the research network, indicating their strong involvement in interdisciplinary collaboration. Their partnerships with industry stakeholders have facilitated the translation of theoretical models into real-world applications, thereby reinforcing the practical relevance of Big Data analytics.

Geographical mapping shows that the United States, China, and the United Kingdom are the top three publishing countries, accounting for over 60% of total research output. This dominance can be attributed to the high levels of technological infrastructure and digital readiness in these nations. However, developing economies are increasingly contributing to the discourse, particularly in studies exploring digital inclusion and the socio-economic impact of data analytics in public sector management.

Keyword evolution analysis further reveals that the term "predictive analytics" gained prominence after 2020, while "data governance" and "artificial intelligence ethics" have emerged as trending topics in recent years. This transition reflects the maturation of the research field from technical implementation to strategic and ethical considerations. The inclusion of governance-related keywords suggests a growing awareness of responsible data usage and the importance of regulatory compliance in analytics-driven organizations.

The co-citation analysis demonstrates the formation of distinct intellectual bases within the literature. One cluster focuses on the technological infrastructure supporting Big Data analytics, while another emphasizes its managerial and behavioral implications. The convergence of these clusters indicates an integrated understanding that technological capacity must align with human and organizational factors to achieve effective data-driven decision making.

The thematic evolution suggests that future research will increasingly explore hybrid models combining machine learning with managerial judgment. This convergence is essential for addressing complex decision-making challenges in uncertain and dynamic environments. Scholars also forecast the emergence of new paradigms integrating ethical governance, sustainability analytics, and digital strategy alignment as central themes in upcoming research.

Finally, the overall bibliometric findings highlight the transformative role of Big Data and analytics in redefining managerial decision-making. The results confirm that data driven strategies are not only enhancing efficiency but also reshaping organizational culture toward innovation and adaptability. By mapping global research trends, this study contributes to a deeper understanding of the field's intellectual trajectory and provides valuable insights for academics, policymakers, and business leaders seeking to harness data for strategic advantage.

Discussion

The findings of this bibliometric study indicate that research on Big Data and analytics in managerial decision-making between 2019 and 2025 has undergone a significant conceptual and methodological transformation. The earlier studies during 2019 - 2020 marked the exploratory phase, focusing on defining Big Data analytics and its relevance to management. In contrast, the subsequent period from 2021 to 2022 represented the consolidation phase, characterized by the integration of analytics into strategic frameworks. By 2023 - 2025, the research focus has expanded toward interdisciplinary collaboration, emphasizing artificial intelligence, ethical governance, and data-driven innovation across industries.

The network visualization reveals the formation of distinct clusters of collaboration among scholars and institutions during the 2019 - 2025 period. Leading researchers such as Fosso Wamba, Akter, and Mikalef have established influential collaborations that bridge management and data science. This cross-disciplinary engagement demonstrates how analytics has evolved from being a technological tool to becoming an essential component of strategic management. The strong international co-authorship links between Europe, Asia, and North America further indicate that global cooperation has accelerated knowledge diffusion and diversified methodological perspectives.

Overlay visualization findings highlight the temporal evolution of research themes within 2019 - 2025, showing a clear transition from technical-oriented studies to strategic and ethical dimensions of Big Data. During the early stage (2019 - 2020), studies focused on data management systems and analytical modeling. In the consolidation stage (2021-2022), research shifted toward digital transformation, decision-support systems, and managerial agility. The expansion phase (2023-2025) emphasizes ethical artificial intelligence, sustainable data governance, and resilience-based decision-making, signaling a maturing field increasingly attuned to global digital ethics and sustainability.

The density visualization also supports this progression, identifying “data-driven decision-making,” “organizational performance,” and “digital transformation” as the most dominant themes during 2019- 2025. These research concentrations highlight the central objective of using analytics to improve managerial effectiveness and long-term competitiveness. However, emerging keywords such as “ethical governance,” “artificial intelligence responsibility,” and “sustainability analytics” suggest that the academic community is broadening its scope to include social, ethical, and environmental considerations in managerial analytics. This indicates that future research is moving toward a multidimensional understanding of data-driven management.

Overall, the bibliometric evidence underscores that between 2019 and 2025, Big Data analytics has evolved into a pivotal force reshaping managerial paradigms. The growing emphasis on ethical artificial intelligence digital resilience, and global collaboration demonstrates a paradigm shift from purely operational efficiency to value-driven and socially responsible decision-making. By mapping these research trends, this study contributes to a holistic understanding of how data analytics supports leadership, innovation, and governance in the digital transformation era. These insights can serve as a foundation for future research and managerial practices that align technological innovation with ethical and sustainable management principles.

CONCLUSION

This bibliometric study provides a comprehensive overview of the global research landscape on Big Data and analytics in managerial decision-making from 2019 to 2025. The findings reveal a progressive shift from technical exploration toward strategic, interdisciplinary, and ethical integration of data analytics in management practices. Three major phases were identified: the exploratory phase (2019 - 2020), focusing on conceptual understanding; the consolidation phase (2021-2022), emphasizing methodological and strategic integration; and the expansion phase (2023-2025), highlighting cross-disciplinary collaboration, ethical governance, and sustainable digital transformation.

The network, overlay, and density visualizations collectively demonstrate how the field has evolved into a mature research domain with strong international collaborations and diversified methodological approaches. Central themes such as “data-driven decision-making,” “organizational performance,” and “digital transformation” dominate the scholarly discourse, while emerging topics like “ethical artificial intelligence” and “sustainability analytics” indicate new directions for future exploration. Overall, the study confirms that Big Data

analytics has become a critical enabler of managerial innovation, strategic foresight, and organizational resilience in the digital era.

Based on the findings, several recommendations can be made for scholars, practitioners, and policymakers. First, future research should expand beyond the technological dimension to include ethical, cultural, and sustainability aspects of Big Data adoption. Integrating social responsibility with data-driven management will ensure that digital transformation aligns with broader societal goals.

Second, collaboration between academia, industry, and government institutions should be strengthened to foster innovation and develop frameworks for responsible data governance. Cross-sector partnerships can accelerate knowledge transfer and ensure that analytical tools are effectively implemented in decision-making processes. Third, practitioners should focus on enhancing data literacy and managerial capabilities within organizations. Investing in human capital, particularly in analytics and ethical leadership, will improve the capacity to translate data insights into strategic actions.

Lastly, policymakers should establish clear regulatory guidelines for data privacy, algorithmic transparency, and accountability. Such frameworks are essential to maintaining public trust and ensuring that the benefits of Big Data analytics are realized without compromising ethical or legal standards. By addressing these dimensions, future efforts can promote a more balanced, responsible, and inclusive approach to data-driven management in the years ahead.

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