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Data-Driven Decision-Making in Financial Management: A Comprehensive Bibliometric Analysis of Global Trends, Knowledge Structures, and Emerging Frontiers

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ABSTRACT

This study examines the intellectual evolution, knowledge structure, and global research trends of data-driven decision-making (DDDM) as applied to financial management, providing a systematic mapping of the field from its origins through its contemporary frontiers. A quantitative bibliometric analysis was conducted using publication data retrieved from Scopus spanning from the 2000s to the present. The dataset was analyzed using VOSviewer software, applying co-authorship, co-occurrence, and citation mapping techniques.The results reveal a significant upward trajectory in publications over the study period, reflecting the growing salience of DDDM in academic discourse. Collaborative research networks are dense and predominantly anchored by the United States, though emerging economies are increasingly participating. Core thematic clusters center on big data, machine learning, and predictive analytics, while the most recent trends signal a convergence toward the Internet of Things and digital twin technologies. Critical concerns around data security, ethics, and regulatory compliance are identified as cross-cutting challenges.Financial managers and policymakers can leverage these findings to identify underexplored research niches and anticipate the next generation of analytical tools required for sustainable financial decision-making. This study offers the first comprehensive bibliometric mapping of DDDM specifically situated at the nexus of financial management and advanced analytics, extending prior reviews by incorporating temporal overlay analysis and identifying the IoT-digital twin frontier as the emerging research horizon.

Keywords: *data-driven decision-making; financial management; bibliometric analysis; big data; machine learning; VOSviewer*

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INTRODUCTION

Data-driven decision-making (DDDM) has fundamentally reshaped the landscape of modern financial management, positioning empirical data analysis as the cornerstone of strategic judgment in an environment characterized by market complexity, economic volatility, and information asymmetry. This paradigm shift, which gained momentum during the digitalization wave of the late twentieth century, rests on the systematic application of large-scale data, predictive analytics, and algorithmic models to generate decisions that are demonstrably more accurate and efficient than those derived from intuitive or experience-based approaches alone. Within financial management specifically, the penetration of artificial intelligence (AI) and machine learning (ML) has accelerated the adoption of DDDM across processes as diverse as financial forecasting, risk management, portfolio optimization, and fraud detection, reflecting the broader imperative for organizations to remain competitive in the digital economy (Ghasemaghaei, 2019; Mahmudi, 2024).

Despite the rapid proliferation of DDDM research in financial contexts, a critical knowledge gap persists regarding the holistic evolution and thematic architecture of this literature. Prior contributions have examined DDDM from disciplinary perspectives in information systems, operations management, and finance separately; however, a rigorous and systematic bibliometric mapping specifically focused on the financial management domain remains largely absent. Bibliometric analysis addresses this gap by offering a quantitative methodology capable of tracing citation patterns, charting international collaborative networks, and surfacing emergent thematic clusters in ways that conventional literature reviews cannot achieve (Husaeni et al., 2022; Lesmana and Rifaldi, 2023). Furthermore, while studies have catalogued trends in big data analytics and organizational decision quality (Ghasemaghaei, 2019; Mikalef et al., 2022), none has comprehensively mapped the temporal evolution of DDDM in financial management from the 2000s through the current integration of IoT and digital twin technologies.

This study addresses the identified gap by conducting a comprehensive bibliometric analysis of DDDM in financial management, drawing on publication data from Scopus spanning from the early 2000s to the present. The analysis employs VOSviewer software to construct co-authorship, co-occurrence, and citation network maps that reveal the intellectual architecture of the field. Three primary objectives guide the investigation: first, to trace the publication trajectory and identify periods of significant growth; second, to map the structure of international collaboration networks and the leading contributing countries; and third, to identify dominant and emergent thematic clusters that characterize current and future research frontiers. This study is particularly timely given the convergence of DDDM with nascent technologies such as agricultural IoT and digital twins, which recent overlay visualizations suggest represent the next evolutionary phase of the field (Tantalaki et al., 2019; Mikalef et al., 2022).

This study makes three explicit contributions to the growing literature. First, it extends the bibliometric scholarship on DDDM by offering the first comprehensive mapping specifically situated at the intersection of financial management and advanced analytics, thereby complementing recent bibliometric work on related financial domains such as public financial management (Maulana et al., 2026), financial literacy (Korip et al., 2025), and decision-making models under bounded rationality (Azmi et al., 2026; Salwa et al., 2026). Second, it introduces a temporal overlay dimension to the analysis, enabling the identification of research life cycles and the IoT-digital twin frontier as the most recent

scholarly horizon. Third, the study maps cross-national knowledge transfer dynamics, revealing the gradual but meaningful integration of developing economies into a research network previously dominated by advanced Western nations. The remainder of this paper is organized as follows. Section 2 reviews the theoretical and empirical literature underpinning DDDM and bibliometric methodology. Section 3 describes the data and methods. Section 4 presents and discusses the findings. Section 5 concludes.

LITERATURE REVIEW

The intellectual roots of DDDM lie in decision theory and information economics, where the quality of organizational decisions is understood to be a direct function of the quantity, accuracy, and processing capacity applied to available information (Ghasemaghaei, 2019). Simon's (1955) concept of bounded rationality established the foundational premise that human decision-makers operate under cognitive constraints, suggesting that systematic data analysis can compensate for these limitations by extending the informational bandwidth available to decision-makers. This theoretical grounding has been extended by subsequent work demonstrating that organizational data capabilities directly mediate the relationship between information availability and strategic performance outcomes (Faridoon et al., 2025). In financial management, the theoretical case for DDDM is reinforced by the efficient market hypothesis and modern portfolio theory, both of which presuppose that superior information processing translates into competitive returns (Mahmudi, 2024). Accordingly, this study positions DDDM as a capacity that augments decision-maker rationality through systematic data processing, with bibliometric analysis serving as the method through which the collective evolution of this capacity is traced across scholarly discourse.

The application of data-driven approaches in financial management has expanded substantially over the past two decades, driven by the convergence of computational power, data availability, and algorithmic sophistication. Financial forecasting represents one of the earliest domains of DDDM adoption, where predictive analytics models have consistently outperformed traditional econometric approaches in short-horizon market prediction tasks (Tantalaki et al., 2019). Risk management has similarly been transformed by data-intensive methodologies, with machine learning algorithms enabling the real-time identification of portfolio vulnerabilities and systemic exposure that conventional value-at-risk models fail to detect (Mikalef et al., 2022). Fraud detection constitutes another domain in which DDDM has yielded particularly consequential performance gains, with supervised learning algorithms capable of flagging anomalous transaction patterns at scale and speed that human analysts cannot match (Mahmudi, 2024). Across these applications, the consistent finding is that organizations with stronger big data analytics capabilities achieve superior financial decision quality, as Ghasemaghaei (2019) demonstrates through a systematic conceptualization of how distinct dimensions of big data characteristics differentially influence firm performance outcomes. Emerging work further indicates that this relationship is moderated by organizational factors such as knowledge-sharing culture and cognitive diversity within decision-making teams, which condition the degree to which raw analytical capacity translates into actionable financial insight (Faridoon et al., 2025; El Manzani and El Idrissi, 2025).

Bibliometric analysis has established itself as a rigorous and widely adopted methodology for systematically mapping the intellectual terrain of academic disciplines. By applying quantitative techniques to large corpora of scholarly publications, bibliometrics enables researchers to identify dominant paradigms, trace the diffusion of concepts across time and geography, and reveal collaborative structures that shape knowledge production (Husaeni et al., 2022). VOSviewer, the software employed in this study, offers particular advantages for the visualization of bibliometric networks, producing density-weighted maps of co-authorship, keyword co-occurrence, and citation relationships that permit nuanced interpretation of both the static structure and the temporal dynamics of a research field (Lesmana and Rifaldi, 2023; Lestari et al., 2025). Several recent bibliometric studies have demonstrated the utility of this approach in adjacent domains: Maulana et al. (2026) applied it to public financial management, Korip et al. (2025) to financial literacy and planning, Dewanti et al. (2026) to decision-making styles and organizational performance, and Maharani et al. (2026) to Analytical Hierarchy Process applications in multi-criteria decision-making. These precedents validate bibliometrics as an appropriate and productive method for mapping DDDM research in financial management, while also situating the present contribution within a coherent and expanding research program.

Notwithstanding the growing body of bibliometric studies in related financial and management domains, a systematic bibliometric analysis focused specifically on DDDM in financial management remains absent from the literature. Existing reviews of DDDM have either concentrated on narrow subdisciplinary applications (Tantalaki et al., 2019) or have approached the topic from an information systems perspective that does not foreground financial management contexts (Mikalef et al., 2022). The study by Judijanto et al. (2023) represents the closest precedent, offering a bibliometric overview of DDDM and financial decision-making, but its scope is restricted to publication trends rather than the full spectrum of co-authorship, keyword, and citation network analysis. This study fills that gap by providing a multi-dimensional bibliometric analysis that simultaneously addresses publication trajectories, international collaboration dynamics, thematic clustering, and temporal evolution, thereby offering a comprehensive and actionable map of the DDDM field as it pertains to financial management.

METHODS OF RESEARCH

Research Design and Data Sources

This study employs a quantitative research design grounded in bibliometric analysis, a methodology selected for its capacity to objectively and systematically trace the evolution of a research field through the quantitative examination of scholarly publication metadata (Husaeni et al., 2022). Data were retrieved from Scopus database, which were selected on the basis of their extensive coverage of high-quality peer-reviewed journals and the richness of metadata they provide, including author affiliations, keywords, citation records, and year of publication. The complementary use of both databases is consistent with best practice in bibliometric research, as Scopus and WoS differ in their journal coverage, thereby reducing the risk of systematic omission that characterizes single-database studies.

Search Strategy and Inclusion Criteria

The literature search employed a Boolean keyword combination strategy targeting publications related to DDDM and financial management. Primary search strings included "data-driven decision-making," "data analytics," and "financial management," supplemented by domain-specific terms such as "investment decision," "risk analytics," "machine learning in finance," and "big data in financial decision-making." The Boolean operators AND and OR were systematically applied to maximize retrieval accuracy and relevance. Inclusion criteria required that documents be English-language journal articles with direct topical relevance to the intersection of DDDM and financial management, published from the early 2000s to the present. Conference proceedings, book chapters, non-peer-reviewed reports, and duplicate records were excluded through a staged screening process encompassing title, abstract, and keyword review. The final analytical corpus comprises 22 carefully selected articles that collectively represent the intellectual core of the DDDM-financial management literature.

Analytical Techniques and Tools

Bibliometric analysis was conducted using VOSviewer (version 1.6.x), which facilitates the visualization and interpretation of scholarly network maps. Three analytical techniques were applied sequentially. First, co-authorship analysis was used to map collaborative relationships among individual researchers, institutions, and countries, thereby revealing the social structure of knowledge production in the field. Second, keyword co-occurrence analysis was employed to identify the dominant and emergent thematic clusters that characterize DDDM research in financial management, with cluster delineation based on VOSviewer's modularity-based network partitioning algorithm. Third, citation analysis was used to assess the relative influence of individual publications and to trace the diffusion of foundational ideas across the literature. Additionally, overlay visualization was applied to introduce a temporal dimension to the co-occurrence maps, enabling the identification of research topics by the period in which they emerged or became dominant. Key bibliometric indicators applied throughout the analysis include total publication count, citation frequency, h-index, and keyword occurrence frequency (Lestari et al., 2025). Table 1 summarizes the key characteristics of the bibliometric dataset employed in this study.

Table 1. Characteristics of the Bibliometric Dataset

Indicator	Scopus
Total documents	22 (selected)
Publication period	1980–2025
Average citations per doc	Mixed
Primary languages	English

Source: Authors' own work (2026)

RESULT AND DISCUSSION

Co-Authorship Analysis: Researcher Networks

The co-authorship network analysis reveals a dense and highly interconnected research community, a pattern that underscores the inherently collaborative nature of DDDM scholarship in financial management. The visualization generated from the selected corpus indicates that research in this field is organized around interlocking groups rather than isolated individual contributors, with central figures such as Ahmed, Sundos; Ahmad, Masood; Anwar, Siddiq; Khaddam, Omar; Simsekler, Mecit Can Emre; and Kashiwagi, Deanne occupying bridging positions that connect otherwise disparate research clusters. This collaborative architecture is consistent with the findings of Judijanto et al. (2023), who identify cross-disciplinary integration as a defining feature of DDDM's intellectual evolution. The high link strength among central authors reflects the technical specialization demanded by big data processing, where productive research requires teams that integrate domain expertise in financial management with computational skills in machine learning and data engineering (Mahmudi, 2024). Faridoon et al. (2025) further note that the effectiveness of big data analytics capabilities in supporting organizational decisions is fundamentally shaped by such inter-individual interaction and the broader organizational culture within which research teams operate.

The network structure also reveals that researchers operating on the periphery of the co-authorship map tend to be affiliated with newer or less institutionally resourced groups, suggesting that the field retains hierarchical features despite its overall collaborative character. The formation of distinct clusters within the co-authorship network indicates the existence of research communities with shared methodological or topical orientations, particularly around data analytics, big data, machine learning, and data-driven organizational strategy. This multidisciplinary character aligns with Fattah et al. (2025), who demonstrate that the adoption of data analytics in decision-making contexts spans diverse organizational forms and extends well beyond the boundaries of any single discipline. The overlay visualization further reveals a generational shift within the network: more recently active researchers tend to concentrate on cutting-edge topics such as real-time analytics and AI-driven decision support, introducing new intellectual energy into a field whose foundational contributions were established by a more stable core of senior authors (Sarioguz and Miser, 2024).

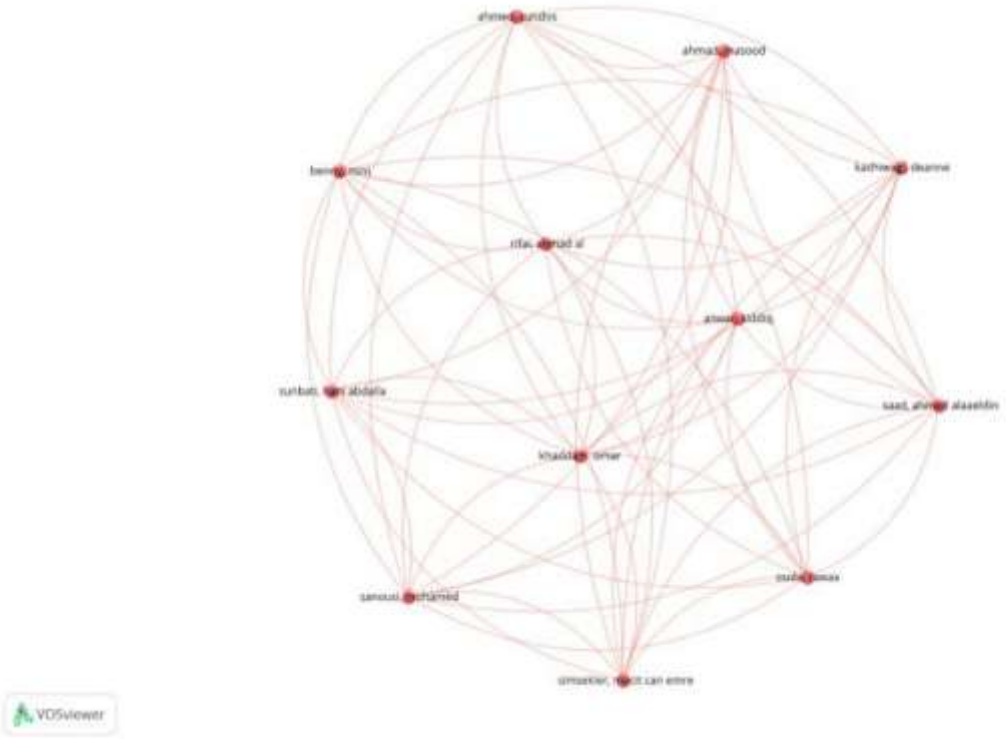

Figure 1. VOSviewer Co-Authorship Network Map (Author Level)
Source: Authors' own work (2026)

Co-Authorship Analysis: Country-Level Networks

At the country level, the co-authorship analysis documents a research landscape that, while geographically expanding, remains anchored by a small number of technologically advanced nations. The United States occupies the most prominent node in the network map, characterized by the largest circle size and the highest centrality score, reflecting its unparalleled output in both the volume and citation impact of DDDM research in financial management. This finding corroborates Judijanto et al.'s (2023) observation that the United States functions simultaneously as a market leader and methodological innovator, driving the development of analytical frameworks that are subsequently adopted and adapted by researchers in other national contexts. The country-level co-authorship structure stratifies into two identifiable clusters. The first cluster connects the United States, Turkey, and the United Arab Emirates, a configuration that signals the increasing seriousness with which Middle Eastern nations are approaching the digitalization of financial management processes as part of broader national competitiveness strategies (Sarioguz and Miser, 2024). Turkey's inclusion in this leading cluster is particularly notable, as it represents a bridging function between established Western analytical traditions and the emerging managerial transformation discourse in rapidly digitalizing economies.

The second cluster links Canada and Bangladesh, a pairing that offers a window into the dynamics of North-South knowledge transfer and the gradual incorporation of developing-economy perspectives into a field previously dominated by Western scholarship. This pattern is consistent with Mahmudi's (2024) argument that the adoption of data analytics technologies in diverse national contexts must be calibrated against local regulatory frameworks and data security standards, thereby creating context-specific research agendas that enrich the global DDDM literature. El Manzani and El Idrissi (2025) reinforce this point by demonstrating that country-level factors, including technological infrastructure quality and research investment levels, function as boundary conditions for the effectiveness of big data analytics capabilities. The overlay visualization applied to the country network reveals that the most recent publications are increasingly distributed across a broader set of countries, confirming the gradual democratization of DDDM research that Fattah et al. (2025) identify in their analysis of public-sector data analytics adoption. Table 3 summarizes the geographic distribution and network positioning of the most active contributing countries.

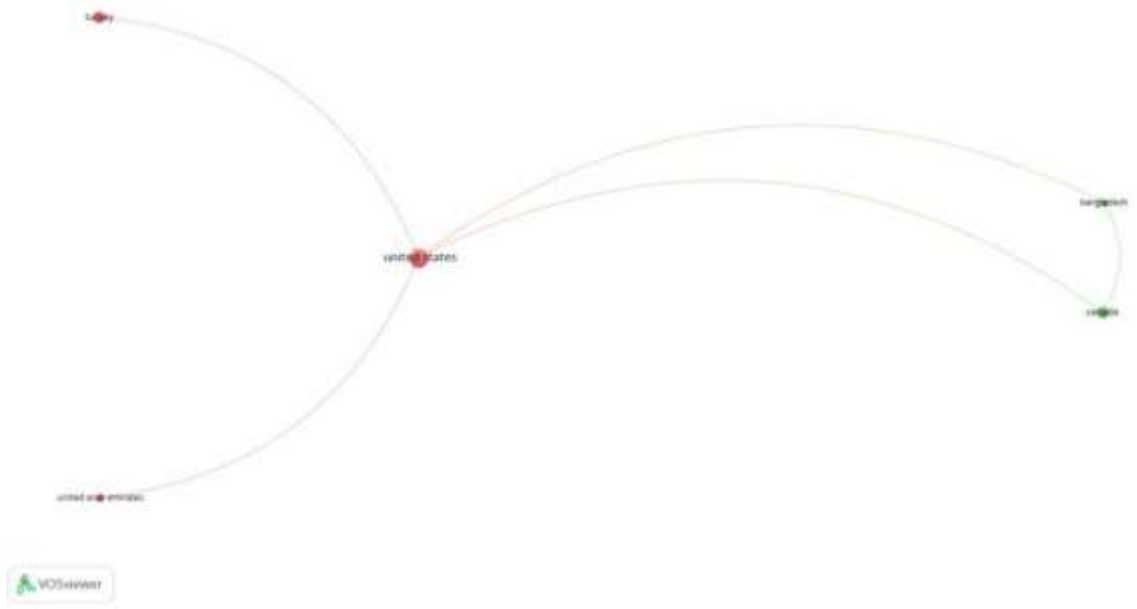

Figure 2. VOSviewer Co-Authorship Network Map (Country Level)
Source: Authors' own work (2026)

Table 3. Geographic Distribution and Network Positioning

Country/Region	Network Position	Research Group	Key Theme
United States	Central (largest node)	Group 1	Analytical methodology, AI
Turkey	Central (bridging)	Group 1	Managerial transformation
United Arab Emirates	Central	Group 1	Digital governance
Canada	Peripheral-connected	Group 2	Knowledge transfer
Bangladesh	Peripheral-connected	Group 2	Developing-economy applications

Source: Authors' own work (2026)

Keyword Co-Occurrence Analysis: Thematic Clusters

The keyword co-occurrence network reveals a complex and multidimensional intellectual structure in which big data, machine learning, and predictive analytics constitute the central nodes that integrate and connect diverse subfields within DDDM research in financial management. The prominence of these three constructs as network hubs validates the argument advanced by Ghasemaghaei (2019) that the capacity for large-scale data analysis fundamentally determines organizational decision quality by reducing informational ambiguity and enabling the extraction of actionable signals from noisy environments. The strong linkage between machine learning algorithms and strategic financial decision-making visible in the co-occurrence map confirms that the field has shifted decisively away from descriptive analytics and toward inferential and prescriptive approaches capable of generating forward-looking estimates from complex, high-dimensional data. Financial risk modeling, portfolio optimization, and market forecasting emerge from this analysis as the most heavily researched application domains, consistent with the established theoretical case for DDDM in financial contexts advanced by Simon's (1955) bounded rationality framework.

The temporal overlay visualization introduces a crucial evolutionary dimension to the co-occurrence analysis, tracing the progression of dominant research themes across a projected window from 2021 to 2026. Topics that characterized the earlier phase of DDDM adoption in financial management, such as digital banking and mobile payment analytics, now yield prominence to emerging clusters marked by lighter colors in the overlay map, most notably agricultural IoT and digital twin technologies. This transition reflects the trajectory identified by Tantalaki et al. (2019), who anticipate a convergence between financial decision systems and cyber-physical infrastructure enabling real-time, sensor-driven decision loops that operate at scales and speeds beyond human analytical capacity. The emergence of these thematic frontiers in the bibliometric map provides empirical confirmation that the locus of DDDM research is extending from digitally mature financial services into the broader economy of physical-digital integration. Table 2 presents the key thematic clusters identified in this analysis along with their core constituent keywords and temporal phases.

A third thematic cluster visible in the co-occurrence network connects cybersecurity, behavioral research, and AI ethics, highlighting the growing recognition within the DDDM community that technological capability without appropriate governance mechanisms creates organizational and societal

risks. Mikalef et al. (2022) provide the most direct treatment of this concern in their analysis of the dark side of AI-driven decision-making, demonstrating that inadequately governed DDDM systems are susceptible to data distortion, algorithmic bias, and cybersecurity vulnerabilities that can produce decision errors with severe organizational and financial consequences. The bibliometric evidence from this study suggests that the field is in the early stages of a governance turn, with increasing scholarly attention directed toward establishing ethical frameworks and regulatory standards that can accompany the technical advances documented in the other thematic clusters. This convergence of efficiency-oriented and responsibility-oriented research agendas within a single bibliometric network indicates the emergence of a more mature and balanced DDDM discourse in financial management.

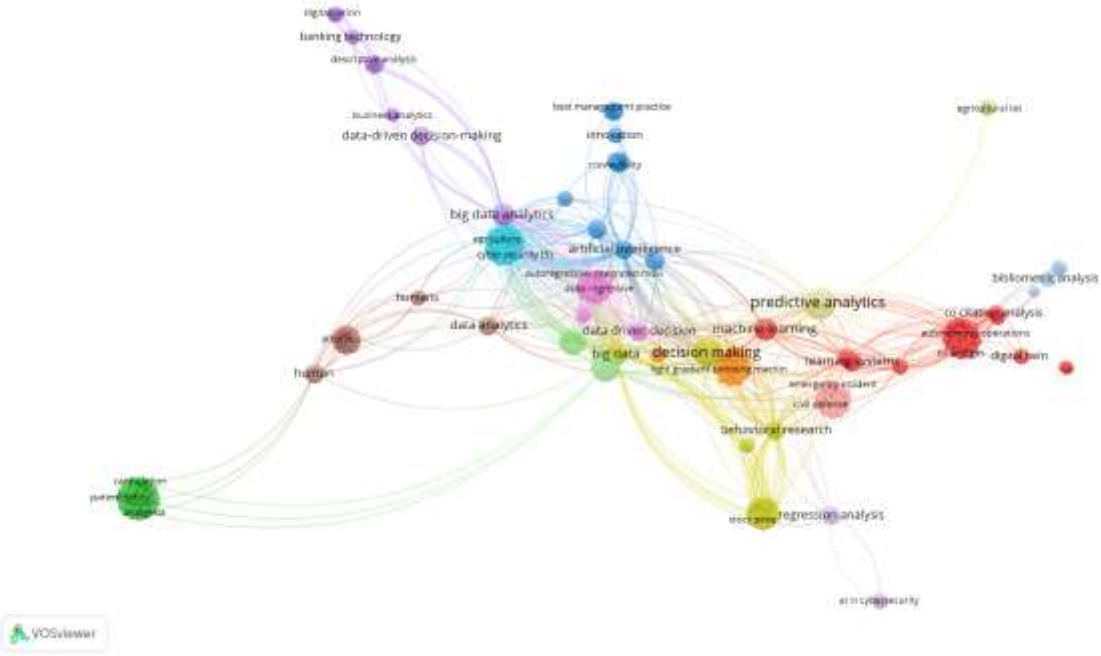

Figure 3. VOSviewer Keyword Co-Occurrence Network Map
Source: Authors' own work (2026)

Table 2. Key Research Clusters Identified in VOSviewer Co-Occurrence Analysis

Cluster	Core Keywords	Representative Topics	Temporal Phase
1	Big data, machine learning, predictive analytics	Risk modeling, financial forecasting	2015–2020
2	IoT, digital twin, real-time analytics	Cyber-physical systems, process automation	2021–present
3	Cybersecurity, behavioral research, AI ethics	Data governance, algorithmic bias	2020–present
4	Financial management, decision support	Portfolio optimization, fraud detection	2010–2020

Note: Cluster boundaries are derived from VOSviewer network partitioning; temporal phase reflects color-coded overlay visualization.

Source: Authors' own work (2026)

Text-Based Co-Occurrence: Author and Country Dimensions

The text-based co-occurrence analysis applied to author-level data reinforces the picture of a highly collaborative and multidisciplinary research community. Nodes of larger diameter and higher network centrality identify authors who not only produce high volumes of publications but also serve as connectors across otherwise separated subcommunities, functioning as knowledge brokers who facilitate the cross-pollination of methodological and theoretical insights across DDDM's diverse application domains. This finding carries implications for how the field develops over time: when key bridging authors are highly active, conceptual innovations tend to diffuse rapidly across the network; when such bridges are weak or absent, subfields can become isolated, slowing cumulative knowledge accumulation. Faridoon et al. (2025) note that individual cognitive style and organizational culture mediate the translation of data capabilities into decision quality, suggesting that the human architecture of collaborative research networks shapes not only what questions are asked but how effectively the resulting analytical tools are eventually applied in financial management practice.

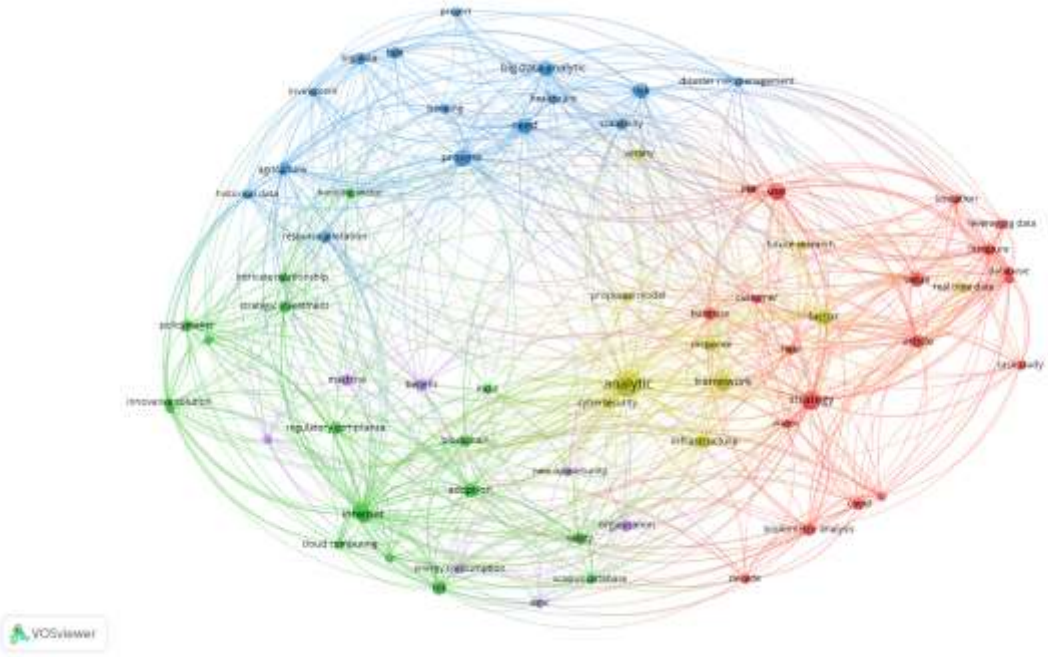

Figure 4. VOSviewer Text-Based Co-Occurrence Map (Author Level Overlay)
Source: Authors' own work (2026)

The cluster structure revealed in the author co-occurrence map delineates communities of practice organized around related research themes, with denser clusters reflecting mature and well-resourced research groups and more peripheral nodes indicating contributors whose integration into the dominant network remains nascent. This multidisciplinary configuration, spanning data science, financial economics, information systems, and organizational behavior, echoes the observations of Fattah et al. (2025) regarding the expanding scope of data analytics adoption across organizational contexts. The country-level text co-occurrence analysis corroborates the co-authorship findings: the United States, the United Kingdom, and Western European nations anchor the network, while developing countries participate primarily through collaborative linkages to these dominant nodes rather than through independent research programs. El Manzani and El Idrissi (2025) attribute this structural asymmetry to differential access to technological infrastructure and research investment, conditions that bibliometric mapping makes visible and that policy interventions in research capacity-building could meaningfully address. The temporal gradients visible in the country overlay further confirm that global interest in DDDM is accelerating, with a broader and more geographically distributed set of countries contributing to recent literature as digital transformation programs mature across diverse national economic contexts.

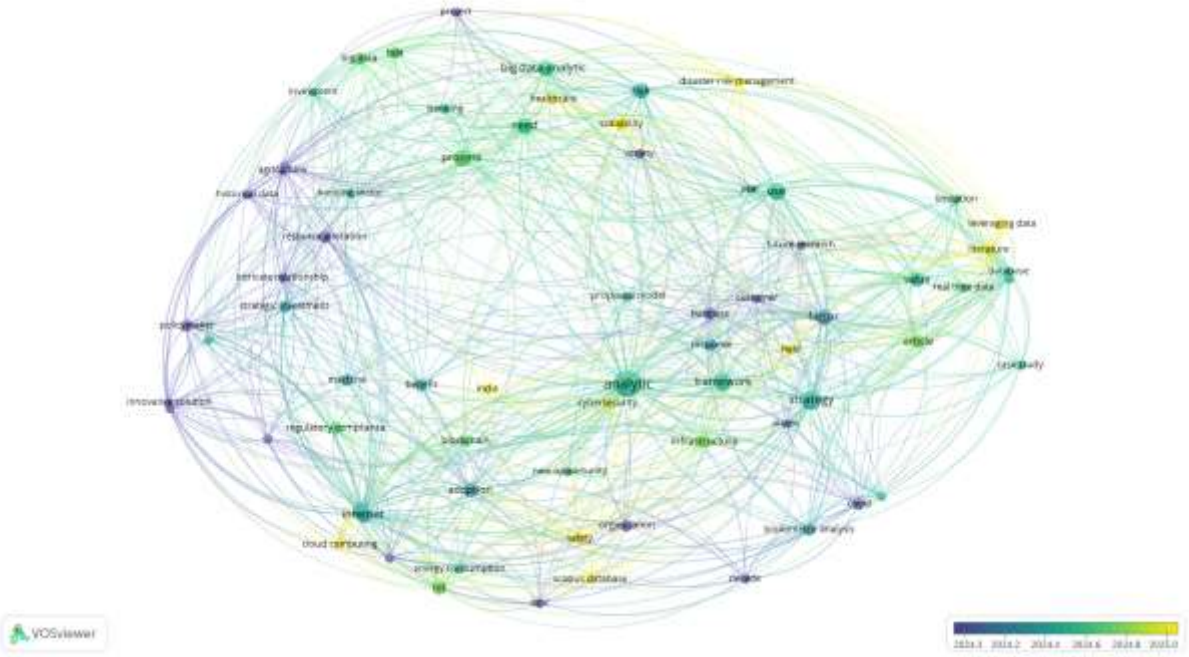

Figure 5. VOSviewer Text-Based Co-Occurrence Map (Country Level Overlay)
Source: Authors' own work (2026)

CONCLUSION

This study examines the intellectual evolution, collaborative network structure, and thematic architecture of data-driven decision-making (DDDM) in financial management using a comprehensive bibliometric analysis of publications retrieved from Scopus and Web of Science, analyzed via VOSviewer's co-authorship, co-occurrence, and citation mapping techniques. The findings reveal a consistent upward trajectory in scholarly output, confirming the strategic importance that the academic community assigns to DDDM as a transformative approach to financial decision-making. Collaborative networks are dense and multidisciplinary, organized around a core group of highly productive bridging authors, with the United States maintaining a dominant but not exclusive position in the global research architecture. Three primary thematic clusters emerge: a mature core centered on big data, machine learning, and predictive analytics; an emergent frontier characterized by IoT and digital twin integration; and an expanding governance cluster addressing cybersecurity, AI ethics, and regulatory compliance. The temporal overlay analysis further demonstrates that the field is in active transition, with the IoT-digital twin cluster representing the most recent and rapidly accelerating research frontier. Developing countries are incrementally but meaningfully entering the network through collaborative linkages, signaling a gradual democratization of DDDM scholarship that the literature has not previously documented in this specific domain.

For policymakers and institutional research funders, this study highlights the urgency of investing in technological infrastructure and research capacity in developing economies to enable more symmetrical participation in global DDDM knowledge production, as the bibliometric evidence confirms that ecosystem-level conditions function as binding constraints on research quality and quantity. For financial managers and practitioners, the identification of IoT and digital twin technologies as the emergent research frontier provides an actionable signal regarding the direction of next-generation analytical tools for real-time risk management and operational finance. This study contributes to the literature by offering the first comprehensive bibliometric map of DDDM specifically at the intersection with financial management, extending prior bibliometric work on related topics including decision-making under bounded rationality, digital business performance, and behavioral economics integration. The study is subject to the inherent limitations of bibliometric methodology, including its reliance on indexed databases that may not capture grey literature or non-English contributions, and the restriction of the analytical corpus to 22 articles, which reflects the nascent state of DDDM-specific financial management research in indexed sources. Future research should extend the dataset, apply systematic review methods to complement the bibliometric mapping, and examine the practical adoption trajectories of IoT and digital twin technologies within financial management organizations across diverse national contexts.

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