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Data-Driven Management: Transforming Organizational Decision-Making in the Digital Era

Herikson Tampubolon
 Universitas Pembinaan Masyarakat Indonesia, Indonesia

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Corresponding Author:
 Author Name*: Herikson
 Tampubolon
 Email*: [rahmatiah@uin-
alauddin.ac.id](mailto:rahmatiah@uin-alauddin.ac.id)

Abstract: *The rapid advancement of digital technologies has fundamentally transformed how organizations collect, process, and utilize data to support strategic decision-making. This study examines the transformation of data-driven management within organizations, exploring how the integration of big data analytics, artificial intelligence, and advanced information management systems reshapes organizational decision processes, operational efficiency, and competitive performance. Drawing on a systematic literature review of eighteen recent empirical and theoretical studies (2017–2026), this paper synthesizes key themes including organizational data culture, analytical maturity, technology infrastructure, human capability development, and governance frameworks. Findings indicate that organizations with mature data-driven cultures exhibit significantly higher decision quality, strategic agility, and innovation capacity. However, successful transformation requires overcoming barriers such as data silos, resistance to change, lack of analytical talent, and ethical concerns around data governance. The study proposes a conceptual framework integrating five dimensions of data-driven organizational transformation and recommends a phased implementation pathway for managers seeking to advance their organizations toward full data-driven management.*

Keywords : *data-driven management; organizational decision-making; big data analytics; digital transformation; data culture*

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INTRODUCTION

In an era marked by an unprecedented acceleration in data generation, organizations across sectors confront both exceptional opportunities and complex challenges in treating data as a strategic asset. The sheer volume, velocity, and variety of available information enable richer insights into customers, operations, and markets than ever before, but they also demand new capabilities for collection, storage, processing, and interpretation.

As a result, traditional decision-making models that depended largely on managerial intuition, anecdotal experience, and static historical reports are increasingly being supplanted by evidence-based processes grounded in analytics, statistical modeling, and real-time monitoring. This shift toward decisions informed by quantitative evidence and algorithmic output is commonly called data-driven management (DDM).

DDM changes not only the tools organizations use, but also the routines, roles, and mindsets required for effective governance: managers must now integrate data literacy into strategic planning, develop infrastructure for reliable data pipelines, and create organizational practices that translate analytic findings into actionable decisions. Because this transition affects strategy formulation, operational execution, and performance measurement, DDM is widely regarded as one of the most significant transformations in modern organizational theory and practice. Its adoption offers the promise of improved accuracy, speed, and scalability in decision making, while also raising important questions about data quality, interpretability, and the allocation of human and technological resources needed to realize its full benefits.

Data-driven decision-making (DDDM) denotes the systematic practice of grounding organizational choices in the rigorous analysis of data, metrics, and empirical evidence rather

than relying solely on intuition, past experience, or isolated anecdotes. As Sarioguz and Miser (2023) contend, DDDM goes beyond adopting new tools or platforms; it represents a deeper paradigmatic shift in management for the information age. Implementing DDDM requires organizations to redesign their decision architectures so that data flows, analytic outputs, and decision points are integrated into everyday workflows. It also demands investment in analytical competencies, training staff to interpret data correctly, developing roles such as data stewards and analysts, and embedding processes for validating and updating analytic models. Equally important is establishing a data-oriented culture in which evidence is routinely consulted, assumptions are questioned, and decisions are documented and revisited in light of new information. Together, these structural, capability, and cultural changes transform how organizations set strategy, allocate resources, and evaluate performance.

The widespread availability of big data analytics platforms, artificial intelligence (AI) tools, business intelligence (BI) dashboards, and management information systems (MIS) has lowered barriers for organizations to develop data-driven capabilities, making these resources accessible across industries and organizational sizes. According to Prakash (2024), the use of big data analytics yields measurable, positive effects on organizational performance, extending beyond improvements in operational efficiency to influence strategic planning, more informed resource allocation, and deeper customer engagement. In a related vein, Mokogwu et al. (2024) show that deploying MIS to support data-driven operations management enhances the quality of strategic decisions in technology-intensive firms, by providing timely, integrated information that managers can use to anticipate trends and coordinate complex processes. Together, these findings suggest that the technological ecosystem now available, combining analytics, AI, BI, and MIS, enables



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organizations not only to optimize day-to-day processes but also to elevate long-term strategic decision making through better information, reduced uncertainty, and more agile responses to changing conditions.

Becoming a truly data-driven organization is rarely simple or uniform despite the clear potential of analytics and related technologies. Empirical studies repeatedly identify a mix of organizational, cultural, and technical obstacles that can block the integration of data into everyday decision routines. Fischer et al. (2023) observe that many firms are stuck in transitional states: they have invested in the technological infrastructure needed for analytics but still lack the cultural buy-in, governance structures, and skilled personnel required to turn raw data into reliable decisions. Complementing this view, Szukits and Móricz (2023) highlight that the presence of an analytical culture and the organization's degree of centralization critically mediate whether data ambitions actually reshape managerial practice; in some settings, centralized decision structures or weak analytic norms can prevent analytic insights from being acted upon. Taken together, these studies suggest that technical deployment alone is insufficient—successful DDDM adoption also requires coordinated changes in leadership practices, data governance, incentives, and workforce capabilities so that analytic outputs are trusted, understood, and embedded in routine decision processes.

This paper seeks to synthesize the existing literature on organizational transformation toward data-driven management, to propose an integrative conceptual framework that links technological, human, and structural elements, and to deliver practical recommendations for leaders who want to advance their organization's data maturity. To that end, the study is organized around three focused research questions. First, it asks which dimensions, such as technology infrastructure, analytical capabilities, governance arrangements, and cultural norms,

constitute a comprehensive model of data-driven organizational transformation. Second, it examines the primary barriers and enablers that shape whether and how organizations successfully adopt data-driven decision making, including factors at the technical, organizational, and interpersonal levels. Third, the paper investigates the downstream effects of data-driven practices on important organizational outcomes, specifically performance, resilience in the face of disruption, and capacity for innovation. By integrating empirical findings with conceptual analysis, the paper aims to produce a usable roadmap that managers can apply to assess current maturity, prioritize investments, and align people, processes, and technology for more consistent, evidence-based decision making.

METHOD

This study uses a systematic literature review (SLR) approach structured around the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to ensure transparency and reproducibility in source selection and synthesis. The review targeted peer-reviewed journal articles and conference proceedings addressing data-driven management, organizational decision-making, big data analytics, and digital transformation in organizations. To build a comprehensive evidence base, structured searches were conducted across major academic databases, Scopus, Web of Science, IEEE Xplore, and Google Scholar, using focused search strings such as "data-driven management," "data-driven decision making," "big data analytics organizations," "digital transformation management," and "organizational data culture."

The temporal scope covered 2017 through 2026 to capture both recent developments and foundational contributions in the field. Retrieved records were screened against predefined inclusion and exclusion criteria; duplicates and clearly irrelevant items were removed, and the remaining studies were

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subject to coding for thematic synthesis and quality appraisal. The final corpus was synthesized to identify dominant themes, methodological trends, and evidence gaps, providing an integrative overview useful for developing the conceptual framework and practical recommendations presented in this paper.

A total of eighteen studies met the review's predefined inclusion criteria and formed the basis of the analysis. Included studies satisfied all of the following conditions: they were published in peer-reviewed journals or indexed conference proceedings; they examined data-driven practices within organizational or managerial contexts; they were available as full-text articles in English; and they presented empirical findings, conceptual frameworks, or theoretical contributions directly relevant to the study's research questions. Papers were excluded if they focused solely on technical data-engineering issues without discussing organizational implications, or if their scope fell outside relevant domains (for example, studies limited to pure medical informatics applications that did not address management or organizational decision processes).

The eighteen selected studies were then subjected to thematic synthesis to distill meaningful patterns across diverse methods and contexts. Individual papers were coded for recurring themes, key constructs, reported relationships, and salient findings; codes were iteratively reviewed and grouped into higher-order categories that captured dominant dimensions of data-driven transformation. These conceptual categories, representing technological enablers, human and cultural factors, governance mechanisms, and observed organizational outcomes, were synthesized into the integrative framework reported in the Results and Discussion sections. Thematic synthesis thus facilitated both cross-study comparison and the development of actionable insights grounded in the assembled evidence.

RESULTS AND DISCUSSION

Conceptual Framework of Data-Driven Organizational Transformation

The synthesis of reviewed literature reveals five interdependent dimensions that characterize data-driven organizational transformation. These dimensions, data collection and infrastructure, analytics capability, decision integration, organizational data culture, and governance, collectively define the maturity of an organization's data-driven orientation. Figure 1 presents the conceptual framework derived from this synthesis.

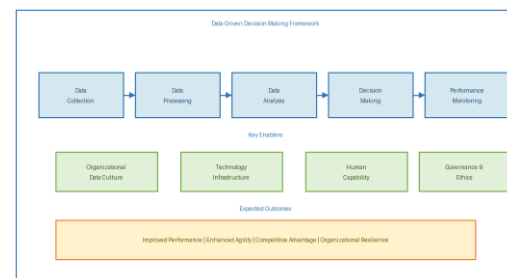


Figure 1. *Conceptual Framework of Data-Driven Organizational Transformation*

The framework conceptualizes data-driven transformation as a sequential yet cyclical process. Beginning with data collection and infrastructure, encompassing databases, IoT systems, and cloud platforms, organizations move through layers of data processing and analytics before integrating insights into decision-making processes. Critically, the framework identifies four key enablers, organizational data culture, technology infrastructure, human capability, and governance, that must be developed in parallel to ensure that the process yields improved organizational outcomes. Gölzer and Fritzsche (2017) similarly highlight that digital transformation in industrial practice generates profound organisational implications that extend well beyond technical system deployment, demanding corresponding adaptations in management structure and workforce roles.



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Poertner et al. (2025) contribute a nuanced perspective through their Data Management Maturity Model, which delineates process dimensions and capabilities required for organizations to progress toward Industry 5.0-readiness. Their model maps organizational progression across five maturity stages, from ad hoc data management to fully optimized, data-centric operations. This aligns with the framework proposed in this study, reinforcing the view that data-driven transformation is a multi-dimensional, organization-wide undertaking rather than a discrete technological upgrade.

Organizational Data Culture and Analytical Maturity

Among the enablers of data-driven transformation, organizational data culture emerges consistently as the most critical factor in the literature. Szukits and Móricz (2023) demonstrate that analytical culture, defined as the collective norms, values, and behaviors that encourage data-based reasoning at all organizational levels, significantly mediates the relationship between analytical tool adoption and actual decision quality improvement. Their findings suggest that technology investment alone is insufficient without corresponding cultural change management.

Chaudhuri et al. (2021) further establish that a strong organizational data-driven culture mediates the adoption of robust business analytics and its subsequent impact on product innovation and organizational performance. Their large-scale empirical study of firms across multiple industries demonstrates that firms with embedded data cultures outperform counterparts in innovation output, market responsiveness, and overall profitability. This finding is corroborated by Fischer et al. (2023), who develop a comprehensive conceptual framework and empirical illustration of data-driven organizations, identifying data culture as one of three core dimensions (alongside data governance and data capability) that define organizational data maturity.

Table 1 presents a comparative overview of organizational characteristics

across different stages of data-driven maturity, synthesized from the reviewed literature.

Table 1. Organizational Maturity Stages in Data-Driven Management

Dimension	Initial Stage	Developing Stage	Mature Stage
Data Culture	Intuition-based; data use is ad hoc	Data awareness growing; partial integration	Data-first culture; evidence-based decisions at all levels
Analytics Capability	Basic reporting only	Descriptive and some predictive analytics	Advanced predictive and prescriptive analytics
Technology	Siloed legacy systems	Integrated platforms with limited real-time capability	Cloud-based, AI-powered, real-time analytics ecosystem
Governance	Minimal data policies; reactive compliance	Formal data governance in place; moderate enforcement	Comprehensive governance; proactive data ethics and privacy management
Human Capability	Low data literacy across organization	Dedicated analytics team; limited democratization	Widespread data literacy; cross-functional analytics teams
Decision Quality	Slow; high error rate; reactive	Moderate improvement; some data validation	Fast; high accuracy; proactive and scenario-based

Impact on Organizational Performance and Resilience

The impact of data-driven management on organizational performance has been documented across multiple dimensions in the

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literature. Jeyaprabha et al. (2025) present evidence from a large-scale conference study that organizations leveraging big data analytics for strategic planning achieve measurable improvements in forecasting accuracy, resource optimization, and competitive positioning. Their findings are consistent with Abdul-Azeez et al. (2024), who demonstrate that data-driven analytics plays a significant positive role in enhancing business performance through improved strategic decision-making across marketing, operations, and finance functions.

Sagar and Sagar (2026) extend this analysis to the domain of organizational resilience, arguing that data-driven decision-making substantially improves an organization's capacity to anticipate, absorb, and adapt to environmental disruptions. Their study, published in 2026, represents the most recent empirical contribution in this corpus, demonstrating that firms with advanced DDDM capabilities recover faster from operational shocks and adapt more effectively to market changes than firms relying on intuition-based management.

Sheng et al. (2017) contribute a foundational multidisciplinary perspective, noting that big data in management research spans operations, marketing, human resources, and strategic management, generating value through pattern recognition, predictive modeling, and real-time monitoring. Their synthesis of the big data management literature provided an early conceptual basis upon which subsequent empirical studies have built, underscoring the cross-functional relevance of data analytics in organizational management.

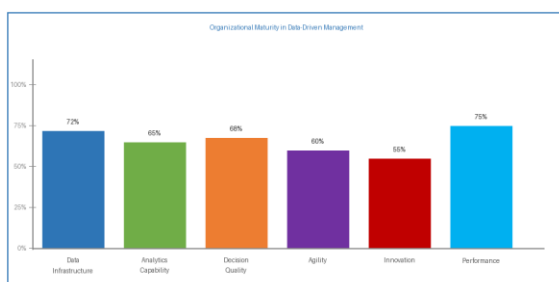


Figure 2. Illustrative Organizational Scores Across Data-Driven Maturity Dimensions (Synthesized from Literature)

Barriers and Challenges to Data-Driven Transformation

Despite evidence that data-driven management can improve performance, organizations still confront a broad set of substantive obstacles when attempting to translate analytic potential into routine managerial practice. Vidgen et al. (2017) identify several central challenges that managers face in extracting value from business analytics: locating and validating relevant data sources amid growing data volumes; securing organizational buy-in so that analytic outputs are trusted and used; and embedding those outputs into established decision-making routines rather than treating them as occasional curiosities. Their analysis underscores that these barriers are not merely technical problems of storage, processing, or algorithm design but also deeply managerial and behavioral issues. Overcoming them requires attention to change management, clear governance arrangements for data use, training and role design to build analytic fluency, and deliberate redesign of workflows so that insights are timely, interpretable, and actionable within existing managerial processes.

Colombari and Neirotti (2024) investigate the practical difficulty of harnessing frontline employees' tacit and experiential knowledge for operational, data-driven decision making, using a multilevel analytical lens. Their findings show that endorsement of DDDM at the strategic level does not automatically translate into effective use at the operational level: frontline staff frequently lack the analytical literacy required to interpret data outputs, the appropriate tools and interfaces to interact with analytics, and the incentive structures that would motivate them to contribute their contextual insights. As a result, valuable operational knowledge remains siloed or under-utilized, producing a persistent mismatch between top-level data strategies and everyday work practices. Colombari and Neirotti argue that this gap creates a systemic



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barrier to transformation—one that cannot be closed solely by investing in analytics platforms but requires coordinated interventions such as targeted training, redesign of work processes to integrate data tasks, user-centred tool design, and alignment of performance incentives so that frontline contributions are captured, valued, and acted upon. Without such multilevel alignment, organizations risk implementing analytics that are technically sound yet operationally ineffective, limiting the practical benefits of data-driven initiatives.

Pugna et al. (2022) explore managers' perspectives on moving toward data-driven organizations within the energy sector and highlight several barriers that are particularly salient in that context. Their study points to regulatory constraints that limit data sharing and impose compliance burdens, entrenched legacy infrastructure that complicates integration with modern analytics platforms, and the intrinsic complexity of energy data—which often involves heterogeneous streams, temporal dynamics, and domain-specific preprocessing requirements. These sector-specific factors amplify both the technical and organizational challenges of adopting DDM: regulatory rules can slow innovation or fragment data access, legacy systems raise integration costs and create blind spots in operational visibility, and complex data structures demand specialized analytic skills and careful model validation. Pugna et al. therefore argue that the sectoral context critically shapes not only which obstacles arise but also their relative severity, implying that generic, one-size-fits-all DDM roadmaps are unlikely to succeed. Instead, effective adoption in energy—and by extension in other heavily regulated or technically complex industries—requires context-sensitive strategies that address compliance pathways, phased infrastructure modernization, and targeted capacity building to handle domain-specific data challenges.

Table 2 summarizes the primary barriers and enablers of data-driven organizational transformation as identified across the reviewed studies.

Table 2. Barriers and Enablers of Data-Driven Management Transformation

Barriers to DDM Transformation	Enablers of DDM Transformation
Data silos and fragmented infrastructure	Strong organizational data culture and leadership commitment
Resistance to change and low data literacy	Investment in analytics training and capability development
Insufficient analytical talent and skills gaps	Robust data governance frameworks
Ethical and privacy concerns in data use	Integration of AI and advanced analytics platforms
Legacy systems incompatible with modern analytics	Frontline employee engagement in data processes
Lack of clear data governance and ownership	Cross-functional collaboration and data democratization
Difficulty measuring ROI of analytics investments	Clear metrics and KPIs aligned to business outcomes

Future Directions: Toward Industry 5.0 and AI-Augmented Management

The trajectory of data-driven management is increasingly intersecting with emerging technological paradigms including artificial intelligence, Internet of Things (IoT), edge computing, and Industry 5.0. Banu (2025) examines the future of work through the lens of data-driven performance management, arguing that AI-powered analytics will fundamentally reshape how organizations assess, develop, and optimize employee performance. This shift toward algorithmic performance management



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raises profound questions about fairness, transparency, and the role of human judgment in AI-augmented organizations.

Poertner et al. (2025) and Gabrišová et al. (2026) place data-driven organizational development squarely within the emerging Industry 5.0 paradigm, arguing that the next stage of DDDM should prioritize human-centred, sustainable, and resilient data ecosystems rather than blind pursuit of full automation. In this perspective, successful future DDDM designs promote close human-machine collaboration: analytics and AI tools are deployed to augment human judgment, provide timely insights, and automate routine tasks, while humans retain responsibility for ethical appraisal, contextual interpretation, and creative problem solving. Emphasizing augmentation over replacement preserves cognitive flexibility and moral reasoning in decision processes and supports workforce roles that are adaptive and value-adding.

Moreover, Industry 5.0-oriented DDDM calls for system architectures and governance models that embed sustainability and resilience considerations—such as energy-efficient data practices, robust privacy and safety safeguards, and redundancy for critical analytic pipelines—so that data capabilities contribute to long-term organizational and societal goals. Poertner et al. and Gabrišová et al. thus suggest that the true frontier of data-driven management lies not simply in technical sophistication but in designing socio-technical ecosystems where human skills, ethical stewardship, and sustainable infrastructure co-evolve with advanced analytic tools to produce decisions that are effective, equitable, and durable.

Abdel (2025) synthesizes developments in data-driven decision-making across applied sciences and management, highlighting the growing importance of integrating domain expertise with machine learning outputs to ensure decision validity and contextual appropriateness. This perspective reinforces the view that effective DDM is not about replacing managerial wisdom with algorithmic outputs, but rather about creating structured, disciplined processes for integrating

data insights with organizational knowledge to produce better-calibrated decisions.

CONCLUSIONS

This study has examined the transformation of organizational decision-making through the lens of data-driven management, synthesizing eighteen recent empirical and theoretical contributions to develop an integrative conceptual framework. The findings confirm that the transition to data-driven management is a multidimensional process encompassing technological, cultural, structural, and human dimensions that must be addressed in an integrated and phased manner.

The review establishes that data-driven management, when successfully implemented, generates substantial improvements in organizational performance across dimensions including decision quality, strategic agility, innovation capacity, and resilience. However, these benefits are contingent upon the development of genuine organizational data cultures, robust governance frameworks, and widespread analytical capabilities—not merely the deployment of analytics technologies.

Key barriers—including data silos, change resistance, analytical talent shortages, and governance deficits—must be proactively addressed through deliberate change management strategies, investment in data literacy programs, and the establishment of clear data ownership and accountability structures. The proposed framework offers a practical roadmap for organizational leaders seeking to advance their data maturity in a structured and sustainable manner.

Future research should focus on longitudinal studies of DDM transformation journeys across different organizational sizes and sectors, the specific role of frontline workers in data-driven operations, the ethical implications of AI-augmented decision-making, and the development of standardized metrics for measuring DDM maturity and its organizational impact.

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