Startupreneur Business Digital (SABDA Journal)
Vol. 5, No. 2, October 2026, pp. 107−118
E-ISSN: 2962-0260 P-ISSN: 2962-0279, DOI:10.33050

Integrating Scientific Data Analytics into Digital Business Strategy

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Article Info

Article history:
Submission 04 February, 2026
Revised 03 June, 2026
Accepted 18 June, 2026
Published 29 June, 2026

Keywords:
Business Strategy
Digital Business
Scientific Data
Strategic Management

ABSTRACT

Amid the increasing complexity of the contemporary digital economy, organizations face growing challenges in transforming large volumes of data into actionable strategic insights. While data analytics has become an essential component of digital business operations, the integration of scientific analytical principles into strategic decision-making remains insufficiently explored. **This study** aims to develop a conceptual framework for integrating Scientific Data Analytics (SDA) into digital business strategy by synthesizing insights from strategic management and data analytics literature. **Using a qualitative** approach based on literature review and thematic content analysis, this study examines how analytical methods such as causal inference, predictive analytics, and evidence-based management can support strategic planning and organizational decision-making. **The analysis** identifies several key themes, including organizational alignment, analytical capability development, data governance, and the role of evidence-based decision-making in enhancing strategic adaptability. The study further highlights potential challenges related to organizational resistance, data quality, and algorithmic bias that may affect analytics adoption. Theoretically, this research contributes by proposing an integrated conceptual framework that connects data analytics capabilities with strategic management processes. **Practically**, the study offers conceptual guidance for managers and decision-makers seeking to strengthen data-informed strategic planning in digital business environments. The findings provide a foundation for future empirical research examining the relationship between scientific analytics integration and organizational performance.

DOI: https://doi.org/10.33050/sabda.v5i2.1076

1. INTRODUCTION

Digital transformation has fundamentally reshaped the way organizations create value, compete in markets, and interact with stakeholders [1]. The rapid advancement of technologies such as Artificial Intelligence (AI), cloud computing, the Internet of Things (IoT), and big data analytics has enabled organizations to generate and access unprecedented volumes of data [2]. In this environment, data is no longer viewed merely as an operational by product but as a strategic resource capable of supporting organizational innovation, enhancing operational efficiency, and strengthening competitive positioning. Consequently, organizations increasingly

seek to leverage analytical capabilities to improve decision-making processes and achieve sustainable business performance [3]. The growing adoption of data analytics has contributed to the emergence of data-driven decision-making practices across various industries [4]. Traditional analytical approaches primarily focus on descriptive and predictive functions, enabling organizations to understand historical performance and anticipate future trends. While these approaches provide valuable insights, they often emphasize correlation-based interpretations without adequately addressing causal relationships between business variables. As a result, organizations may face challenges in determining whether observed patterns genuinely reflect underlying drivers of performance or merely represent statistical associations [5]. This limitation can reduce the effectiveness of strategic decisions, particularly in complex and rapidly changing business environments [6].

To address these challenges, recent developments in SDA have introduced more rigorous analytical approaches that integrate principles of hypothesis testing, experimentation, causal inference, and evidence-based evaluation [7]. These approaches extend beyond conventional analytics by emphasizing the validation of business assumptions through systematic investigation and empirical reasoning. Through the application of scientific analytical methods, organizations can gain a deeper understanding of strategic issues, evaluate alternative courses of action, and improve the quality of managerial decision-making [8]. As a result, the integration of scientific analytics into business strategy has emerged as an important area of interest within both data science and strategic management research [9]. Despite the increasing recognition of analytics as a strategic capability, significant challenges remain in translating analytical outputs into meaningful organizational actions [10]. Previous studies have highlighted issues related to data governance, organizational silos, limited analytical competencies, resistance to data-driven cultures, and the persistent disconnect between technical analytics teams and executive decision-makers [2]. This study aligns with the Sustainable Development Goals (SDGs), specifically SDG 9 (Industry, Innovation and Infrastructure) and SDG 8 (Decent Work and Economic Growth), by highlighting how SDA strengthens digital innovation, infrastructure and data-driven decision-making in digital business strategies and improves productivity, competitiveness and sustainable economic growth through the effective use of data analytics in business processes.

Furthermore, much of the existing literature focuses either on the technical performance of analytical models or on broader discussions of digital transformation, with relatively limited attention given to how scientific analytical methodologies can be systematically integrated into strategic management processes [11]. This fragmentation has created a gap between analytical capabilities and their practical application in organizational strategy [12]. Therefore, this study seeks to address this gap by developing a conceptual framework that integrates SDA with digital business strategy [13]. Unlike previous studies that mainly discuss analytics from technical or operational perspectives, this study specifically integrates scientific analytical principles with strategic management dimensions to provide a more comprehensive framework for digital business strategy development. By synthesizing insights from the strategic management and data analytics literature, this research aims to provide a structured understanding of how scientific analytical approaches can support evidence-based decision-making and contribute to more adaptive and strategically aligned organizations [2]. The proposed framework is expected to offer both theoretical insights for future academic research and practical guidance for managers seeking to strengthen the role of analytics in strategic planning.

2. LITERATURE REVIEW

Digital transformation has radically changed how organizations create value, compete, and make strategic decisions. As businesses increasingly operate in data-rich environments, integrating digital technologies and advanced analytical approaches is essential for achieving a sustainable competitive advantage. In this context, digital business strategy provides a strategic foundation for leveraging digital technologies, while Data Science offers a systematic, evidence-based approach to extracting useful insights from data. Understanding the interaction between these two areas is crucial to explaining how organizations can transform their analytical capabilities into strategic business value. Therefore, this literature review examines the theoretical foundations of digital business strategy and Data Science as key constructs underpinning the proposed conceptual framework.

2.1. Digital Business Strategy

Digital business strategy has emerged as a critical area of research as organizations increasingly rely on digital technologies to create value and sustain competitive advantage. Unlike traditional business strategies

that primarily focus on market positioning and resource allocation, digital business strategies emphasize the integration of technological capabilities, data resources, and organizational agility [14]. Recent studies suggest that digital technologies enable organizations to develop more adaptive business models, improve customer engagement, and accelerate innovation processes [15]. However, the successful implementation of digital strategies requires more than technological adoption alone. Organizations must align technological investments with business objectives, governance structures, and organizational capabilities to ensure that digital transformation initiatives generate meaningful strategic outcomes [16]. Despite the recognized benefits of digital business strategies, scholars have reported mixed results regarding their effectiveness. While some organizations achieve significant improvements in performance through digital transformation, others struggle to realize expected benefits despite substantial investments in digital infrastructure. This phenomenon highlights the importance of understanding the organizational mechanisms that translate technological capabilities into strategic value. Consequently, researchers increasingly argue that competitive advantage is determined not only by access to digital technologies but also by the ability to effectively integrate data, analytics, and managerial decision-making processes [17].

2.2. Scientific Data Analytics

SDA extends traditional business analytics by incorporating principles derived from the scientific method, including hypothesis testing, experimentation, causal reasoning, and evidence based evaluation [18]. Whereas conventional analytics often focuses on identifying correlations and forecasting trends, SDA seeks to establish a deeper understanding of causal relationships and the mechanisms underlying organizational outcomes. This approach enables decision-makers to move beyond descriptive observations and develop strategies grounded in systematic evidence. The growing interest in SDA reflects broader developments in evidence based management and data-driven decision-making. Scholars argue that organizations increasingly require analytical approaches capable of addressing complex and dynamic business environments where intuition alone may be insufficient. Through techniques such as causal inference, controlled experimentation, and predictive modeling, scientific analytics can support more informed strategic decisions. Nevertheless, several researchers caution that analytical sophistication does not automatically guarantee organizational success. The effectiveness of scientific analytics depends heavily on data quality, governance mechanisms, managerial interpretation, and organizational readiness to act upon analytical insights [19].

2.3. Data-Driven Decision-Making and Strategic Management

Data-Driven Decision-Making (DDDM) has become a prominent framework for understanding how organizations utilize data to improve managerial effectiveness [20]. The central premise of DDDM is that decisions supported by systematic evidence are more likely to produce favorable outcomes than those based primarily on intuition or personal judgment. Previous research has linked data-driven practices to improvements in operational performance, innovation capability, and strategic responsiveness. However, the relationship between analytics and organizational performance remains more complex than often portrayed [13]. Several studies have reported that the mere availability of data does not necessarily lead to better decisions. Instead, organizational culture, leadership support, and analytical literacy play critical roles in determining whether data-driven initiatives produce meaningful results. Consequently, researchers increasingly emphasize the need to view analytics not merely as a technological resource but as a socio-technical capability that requires alignment between people, processes, and technology [21].

2.4. Critical Perspectives on Analytics Adoption

Despite its potential benefits, analytics implementation faces several challenges. The IT Investment Paradox suggests that large investments in analytics and information technology do not always improve organizational performance due to poor strategic alignment and limited organizational capabilities [22]. Additionally, the effectiveness of analytics depends on high-quality data, yet many organizations struggle with fragmented, inconsistent, or incomplete datasets [23]. Another concern is algorithmic bias, where predictive models may reinforce existing biases and produce unfair or inaccurate outcomes. Furthermore, organizational resistance can hinder analytics adoption, as employees and managers may distrust data-driven recommendations or fear losing autonomy and job security [24]. Therefore, successful analytics implementation requires not only advanced technology but also strong data governance, ethical oversight, and effective change management.

2.5. Theoretical Foundation

This study draws upon the Resource Based View (RBV), Dynamic Capabilities Theory, and DDDM perspectives. RBV suggests that organizations achieve competitive advantage through valuable, rare, inimitable, and non-substitutable resources. In the context of digital business, analytics capabilities may function as strategic resources that enable organizations to generate unique insights and improve decision quality [12]. Dynamic Capabilities Theory complements RBV by emphasizing an organization's ability to sense opportunities, seize emerging possibilities, and transform resources in response to environmental change [10]. Scientific analytics can support these capabilities by enabling organizations to identify market signals, evaluate strategic alternatives, and adapt more effectively to uncertainty. Meanwhile, DDDM provides an operational perspective by explaining how evidence based practices influence managerial decision-making processes. Together, these theoretical perspectives offer a comprehensive foundation for understanding the strategic role of scientific analytics within digital organizations [1].

2.6. Research Gap

Although previous studies have examined digital transformation, business analytics, and data-driven decision-making, several gaps remain. Existing research predominantly emphasizes technical aspects of analytics, such as predictive accuracy and algorithmic performance, while giving limited attention to the integration of scientific analytical methodologies into strategic management processes. Moreover, analytics capabilities and business strategy are often treated as separate domains, resulting in limited understanding of how scientific analytics supports strategy formulation and execution [25]. Despite the widely recognized benefits of analytics adoption, organizational challenges including governance failures, algorithmic bias, organizational resistance, and the Information Technology (IT) investment paradox remain underexplored. Therefore, a conceptual framework is needed to explain how SDA can be strategically integrated into digital business environments [26].

3. METHOD

This study employs a systematic literature review approach to develop a conceptual understanding of the integration between SDA and digital business strategy. Rather than generating empirical findings through primary data collection, the study synthesizes existing scholarly knowledge to identify key concepts, recurring themes, and theoretical relationships reported in prior research. A systematic literature review was selected because it enables a rigorous and transparent examination of existing evidence while reducing subjectivity in the literature selection and analysis process. The increasing importance of data-driven decision-making has encouraged organizations to adopt advanced analytical techniques as part of their strategic initiatives. However, the existing literature remains fragmented across multiple disciplines, including business strategy, data analytics, information systems, and digital transformation. As a result, there is limited conceptual integration regarding how scientific analytical approaches can be effectively aligned with organizational strategy. By systematically reviewing previous studies, this research seeks to consolidate dispersed knowledge and provide a clearer understanding of the mechanisms through which SDA contributes to strategic planning, organizational agility, and business value creation. Through a structured review process, relevant literature was identified, evaluated, and synthesized to provide a comprehensive perspective on the role of SDA in digital business environments. The review emphasizes the identification of key analytical capabilities, strategic alignment factors, governance mechanisms, and organizational challenges that influence successful analytics integration. The findings from the reviewed studies were subsequently analyzed and synthesized to develop an integrated conceptual framework that explains the relationship between scientific analytics and digital business strategy. The methodological procedures adopted in this study, including the research design, literature selection criteria, data sources, and analytical techniques, are described in the following subsections.

3.1. Research Design

This study adopts a qualitative research design based on a literature review approach to examine the integration of SDA into digital business strategy. Rather than testing hypotheses empirically, the study aims to synthesize existing knowledge, identify recurring themes, and develop a conceptual framework that explains how scientific analytical approaches support strategic decision-making and value creation in digital organizations. A qualitative literature review was considered appropriate because it enables a comprehensive examination of theoretical perspectives, concepts, and findings reported in previous studies. Through this approach,

the study seeks to understand the relationships between analytical capabilities, strategic alignment, and organizational outcomes within the context of digital transformation. The review also facilitates the identification of research gaps and emerging issues that require further scholarly attention.

Figure 1. Research Framework

Figure 1 illustrates the research framework adopted in this study. The process began with the identification of the research problem, followed by literature search, screening, selection, and data extraction. Relevant studies were collected from credible academic sources and evaluated based on predefined criteria to ensure their relevance to the objectives of the study. The selected literature was subsequently analyzed using thematic analysis to identify key concepts and relationships related to SDA and digital business strategy. The findings were then synthesized to develop an integrated conceptual framework and formulate the study's conclusions and implications. Overall, Figure 1 demonstrates the systematic procedure employed to ensure a rigorous and structured literature review process.

3.2. Data Sources and Selection Criteria

The study relies exclusively on secondary sources obtained from academic journals, scholarly books, conference proceedings, industry reports, and professional publications related to data analytics, strategic management, and digital business transformation [27]. The selection of literature followed purposive sampling principles to ensure that the reviewed sources were directly relevant to the objectives of the study. In addition, a structured screening process was applied to identify studies that demonstrate strong conceptual, methodological, and empirical contributions to the field. This process involved evaluating the relevance of each source to the core themes of SDA, digital strategy formulation, and evidence-based decision-making. Emphasis was placed on high-quality and peer-reviewed publications to maintain academic rigor and reduce the inclusion of non-scholarly or outdated materials. Through this approach, the study ensures that the synthesized literature provides a comprehensive and reliable foundation for analyzing the integration of analytics within digital business transformation contexts.

Table 1. Literature Selection Criteria

Criteria	Description
Relevance	Studies addressing SDA, digital business strategy, Data-Driven Decision-Making, or Evidence-Based Management.
Publication Type	Peer-reviewed journal articles, scholarly books, conference proceedings, and industry reports.
Publication Period	Priority was given to recent publications reflecting contemporary developments in analytics and digital transformation.
Source Credibility	Publications originating from reputable academic publishers, professional organizations, and recognized industry institutions.
Language	English-language publications to ensure consistency in analysis and interpretation.
Research Focus	Studies discussing analytics integration, strategic management, organizational challenges, governance issues, or evidence-based decision-making.

The inclusion criteria consisted of three considerations, as summarized in Table 1. Publications were required to address topics related to scientific analytics, data-driven decision-making, digital business strategy, or evidence-based management. Priority was given to recent publications to capture contemporary developments in analytics and digital transformation. In addition, only sources from reputable academic publishers, professional organizations, or recognized industry institutions were included to ensure the credibility and reliability of the reviewed materials. These criteria were designed to ensure that the selected literature was relevant, current, and methodologically trustworthy, thereby providing a solid foundation for the study's analysis and synthesis of findings.

3.3. Data Collection Procedure

The literature collection process was conducted systematically through several stages. Initially, relevant publications were identified using keywords such as "scientific data analytics," "digital business strategy," "data driven decision-making," "evidence-based management," and "causal inference." The identified literature was then screened based on title, abstract, and content relevance [28]. Publications that met the inclusion criteria were selected for detailed review and analysis. Following the screening process, relevant information was extracted from the selected sources. Particular attention was given to theoretical perspectives, analytical approaches, organizational challenges, and strategic implications associated with analytics adoption. The extracted information was subsequently organized into thematic categories to facilitate conceptual synthesis [29].

3.4. Data Analysis Technique

This study employed thematic content analysis as the primary analytical technique to systematically examine and synthesize the selected literature. This method allows for the identification, classification, and interpretation of recurring concepts, themes, and patterns across multiple scholarly sources. Through a structured coding process, relevant information was extracted and organized into thematic categories reflecting key dimensions of analytics-driven strategy development, including strategic alignment, organizational capabilities, data governance, decision-making processes, and digital transformation outcomes. Thematic content analysis was well-suited to this study because it facilitated the integration of findings from multiple disciplines while maintaining the contextual richness of the original studies. Furthermore, this approach supported the identification of relationships, emerging trends, and research gaps in the literature, thus contributing to the development of a comprehensive conceptual understanding of how business analytics impacts strategic management practices in contemporary organizations. By systematically comparing and synthesizing evidence from multiple sources, the analysis provided a strong foundation for drawing theoretical insights and practical implications from the reviewed literature. Furthermore, the iterative nature of the analysis allowed for continuous refinement of themes as new insights emerged during the coding process, ensuring that the categorization remained dynamic and aligned with the evolving understanding of the literature. Cross-validation of themes was conducted by repeatedly reviewing the source material to increase consistency and reduce interpretive bias.

Table 2. Thematic Categories Identified from Literature

Theme	Description
Analytical Capability	The organizational ability to collect, process, analyze, and interpret data to support strategic decision-making.
Evidence-Based Management	The use of empirical evidence, scientific reasoning, and analytical insights to guide managerial actions and organizational strategies.
Strategic Alignment	The alignment between analytics initiatives, business objectives, and organizational priorities to maximize strategic value.
Data Governance	Policies, processes, and mechanisms that ensure data quality, integrity, security, accessibility, and regulatory compliance.
Organizational Resistance	Cultural, managerial, and behavioral barriers that may hinder the adoption of analytics-driven practices within organizations.
Ethical and Algorithmic Concerns	Issues related to transparency, fairness, accountability, privacy, and algorithmic bias in analytics systems and AI applications.

The analysis was conducted in three stages. The reviewed literature was examined to identify recurring concepts related to scientific analytics and strategic decision-making. These concepts were then grouped into thematic categories, including analytical capabilities, organizational alignment, evidence-based management, data governance, and organizational barriers Table 2. The themes emerged through systematic coding and synthesis of the selected studies and formed the basis for further analysis. Relationships among these themes were synthesized to develop an integrated conceptual framework explaining the role of SDA in digital business strategy [30]. This thematic analysis enabled the study to move beyond description toward a structured conceptual understanding, while also clarifying interconnections among themes to better explain how analytics capabilities support strategic decision-making and organizational transformation in digital business environments.

3.5. Trustworthiness and Ethical Considerations

To enhance the credibility of the findings, the study applied source triangulation by comparing evidence obtained from academic literature, industry reports, and documented organizational practices. This approach helped ensure consistency across different sources and reduced the risk of relying on a single perspective. Because the study utilized publicly available secondary sources, no direct involvement of human participants was required. Nevertheless, ethical research principles were maintained throughout the study by ensuring accurate citation practices, proper acknowledgment of original authors, and objective interpretation of the reviewed literature. The analysis was conducted transparently to minimize researcher bias and support the reliability of the conceptual conclusions presented.

4. RESULT AND DISCUSSION

Based on the thematic analysis of the selected literature, this section interprets the findings in relation to the research objectives by synthesizing key patterns across previous studies [31]. The synthesis provides a structured understanding of how SDA contributes to digital business strategy. The analysis identifies five key dimensions analytical capability, strategic alignment, evidence-based management, data governance, and organizational readiness as central constructs in integrating analytics into strategic decision-making. This section also examines the relationships among these dimensions and their collective impact on organizational performance and digital transformation success. It further highlights enabling factors and structural conditions that influence the effectiveness of analytics implementation in business contexts. By integrating empirical and theoretical insights, this discussion bridges fragmented literature to provide a comprehensive view of analytics in contemporary strategic management.

4.1. Results of Literature Synthesis

The thematic analysis of the selected literature revealed five key dimensions influencing the integration of Scientific Data Analytics (SDA) into digital business strategy [32]. These dimensions analytical capability, strategic alignment, evidence-based management, data governance, and organizational readiness consistently

emerged across studies on data-driven decision-making and digital transformation. Collectively, they provide the foundation for integrating scientific analytics into organizational decision-making processes [33]. The literature indicates that the strategic value of analytics increases when analytical capabilities are aligned with business objectives and supported by robust governance mechanisms. Conversely, weak governance, poor data quality, and organizational resistance can diminish its effectiveness [34]. Furthermore, high levels of investment in analytics alone are insufficient without managerial alignment and organizational adaptability, reinforcing the view that analytics effectiveness depends on both technological and socio-technical integration [35].

Table 3. Key Findings from Literature Synthesis

Dimension	**Key Findings**
Analytical Capability	Organizations require advanced analytical competencies to transform data into actionable strategic insights.
Strategic Alignment	Analytics initiatives generate greater value when aligned with organizational goals and executive decision-making.
Evidence-Based Management	Scientific analytical approaches support more objective and evidence-driven strategic decisions.
Data Governance	Data quality, accessibility, and governance structures directly influence analytical effectiveness.
Organizational Readiness	Leadership support and organizational culture significantly affect analytics adoption and utilization.

As presented in Table 3, the literature synthesis identified five key dimensions influencing the integration of SDA into digital business strategy, analytical capability, strategic alignment, evidence-based management, data governance, and organizational readiness. analytical capability reflects an organization's ability to transform data into actionable insights through advanced analytical tools and expertise. Strategic Alignment emphasizes the integration of analytics initiatives with organizational goals and decision-making processes, while Evidence-Based Management promotes the use of scientific methods to support objective and reliable strategic decisions. The findings further highlight the importance of Data Governance, including data quality, accessibility, and governance structures, as well as Organizational Readiness, which encompasses leadership support and a culture that encourages analytics adoption. Collectively, the dimensions summarized in Table 3 provide the foundation for effective analytics integration and the creation of strategic value in digital business environments. These findings indicate that successful integration requires not only technological infrastructure but also managerial commitment and organizational adaptation.

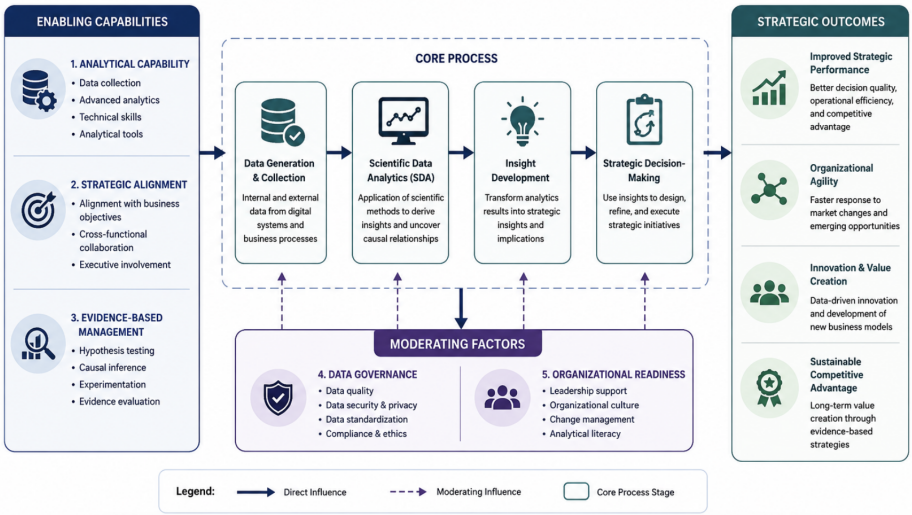

Figure 2. Integration Process of Scientific Data Analytics in Digital Business

Figure 2 illustrates the integration process of SDA into digital business strategy through the interaction

of organizational capabilities, analytical processes, moderating factors, and strategic outcomes. The framework shows that enabling capabilities, such as analytical capability, strategic alignment, and evidence-based management, support the core analytical process consisting of data collection, scientific analysis, insight development, and strategic decision-making. Furthermore, Figure 2 emphasizes the moderating roles of data governance and organizational readiness in strengthening analytics effectiveness. The framework also demonstrates that successful analytics integration can improve strategic performance, organizational agility, innovation, and sustainable competitive advantage.

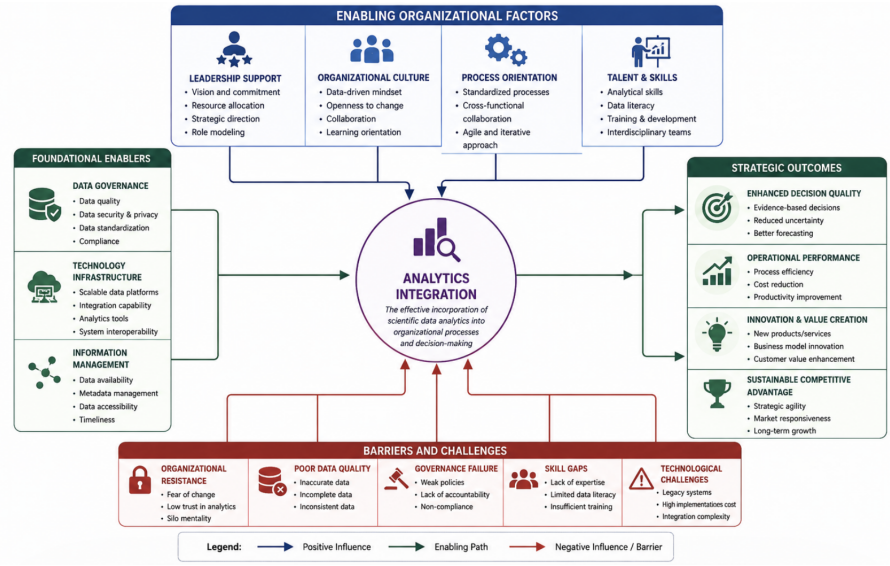

Figure 3. Organizational Enablers and Barriers in Analytics Integration

Figure 3 illustrates the organizational factors influencing the successful integration of analytics within digital business environments. The framework highlights that enabling organizational factors, including leadership support, organizational culture, process orientation, and employee analytical skills, play important roles in supporting analytics integration. In addition, foundational enablers such as data governance, technology infrastructure, and information management provide the necessary support for effective data utilization and analytical processes. Figure 3 also identifies several barriers and challenges, including organizational resistance, poor data quality, skill gaps, and technological limitations, which may hinder analytics implementation. The framework further demonstrates that successful analytics integration can lead to enhanced decision quality, improved business performance, innovation, organizational agility, and sustainable competitive advantage.

5. MANAGERIAL IMPLICATION

The findings of this study suggest that organizations should treat SDA not merely as a technological tool, but as a strategic capability that supports evidence-based decision-making and long-term business competitiveness. Managers are encouraged to align analytics initiatives with organizational objectives to ensure that analytical insights contribute directly to strategic planning and operational improvement. This alignment can help organizations improve decision quality, respond more effectively to market changes, and strengthen organizational adaptability in increasingly dynamic digital environments.

Furthermore, the study highlights the importance of organizational readiness in supporting successful analytics integration. Business leaders should invest in analytical skill development, foster a data-driven organizational culture, and encourage collaboration between technical teams and strategic decision-makers. Leadership commitment and change management also play critical roles in reducing organizational resistance and increasing employee acceptance of analytics-driven practices. Without sufficient managerial support and analytical literacy, organizations may struggle to transform data into actionable strategic value.

In addition, organizations should strengthen foundational capabilities such as data governance, information management, and technology infrastructure to maximize the effectiveness of analytics adoption.

Managers need to ensure data quality, security, privacy, and regulatory compliance to support reliable analytical outcomes and reduce risks associated with algorithmic bias and governance failures. By integrating strong governance mechanisms with advanced analytical capabilities, organizations can enhance innovation, improve operational performance, and achieve sustainable competitive advantage in digital business environments.

6. CONCLUSION

This study develops a conceptual framework for integrating SDA into digital business strategy through a synthesis of literature from the fields of data analytics, strategic management, and digital transformation. The findings indicate that the effective use of scientific analytical approaches extends beyond technological implementation and requires the alignment of analytical capabilities, strategic objectives, and evidence-based management practices. The proposed framework highlights the importance of transforming data into actionable insights that can support strategic decision-making and organizational adaptability in increasingly dynamic digital environments.

The study further identifies several organizational factors that influence the successful integration of analytics, including leadership support, organizational culture, data governance, technology infrastructure, and analytical competencies. At the same time, the literature reveals that challenges such as organizational resistance, poor data quality, governance failures, skill gaps, and technological limitations may hinder the realization of analytics-driven value. These findings suggest that organizations should adopt a holistic approach to analytics integration by addressing both technical and organizational dimensions. Rather than viewing analytics solely as a technological resource, organizations should treat it as a strategic capability that requires continuous development and organizational commitment.

From a theoretical perspective, this study contributes to the literature by proposing an integrated framework that connects SDA with strategic management concepts, including the Resource-Based View, Dynamic Capabilities Theory, and Data-Driven Decision-Making perspectives. Practically, the framework provides guidance for managers seeking to strengthen evidence-based strategic planning and enhance organizational performance through analytics adoption. However, as this study is conceptual in nature and based on literature synthesis. Future studies may also explore the implementation of SDA in startup ecosystems, SMEs, and AI-driven digital platforms using quantitative approaches such as SEM or mixed-method analysis. Such investigations would provide deeper insights into the mechanisms through which scientific analytics contributes to strategic performance and sustainable competitive advantage.

7. DECLARATIONS

7.1. About Authors

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7.2. Author Contributions

Conceptualization: KS; Methodology: IA; Software: LM; Validation: KS and IA; Formal Analysis: LM and AC; Investigation: KS; Resources: IA.; Data Curation: LM; Writing Original Draft Preparation: AC and KS; Writing Review and Editing: KS and IA; Visualization: KS; All authors, KS, IA, LM and AC, have read and agreed to the published version of the manuscript.

7.3. Data Availability Statement

In line with our commitment to research transparency, the dataset underlying this study has beenarchived in the Zenodo Repository https://doi.org/10.5281/zenodo.20758403 and is accessible upon request to the corresponding author.

7.4. Funding

The authors did not receive any financial support for conducting the research, preparing the manuscript, or publishing this article.

7.5. Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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