

Orchestrating Big Data and Artificial Intelligence for Adaptive Digital Business Strategy

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ABSTRACT

The rapid acceleration of digital transformation has changed the way organizations formulate and implement business strategies, requiring firms to become more adaptive, data-driven, and responsive to dynamic market conditions. **This study aims** to examine how big data and artificial intelligence can be orchestrated as integrated strategic capabilities to support adaptive digital business strategy. Using a **qualitative conceptual** approach, this study applies a structured literature review and thematic synthesis to analyze previous studies related to big data capability, artificial intelligence capability, governance mechanisms, intelligent business insight, and strategic adaptability. **The results** show that big data functions as a strategic foundation by providing diverse information from customers, markets, operations, and digital platforms, while artificial intelligence acts as an intelligent decision engine that transforms data into predictions, recommendations, automation, and actionable business insights. **The findings** also indicate that governance and human decision-making are essential in ensuring that the use of big data and AI remains reliable, transparent, accountable, secure, and aligned with organizational objectives. **This study concludes** that adaptive digital business strategy emerges from the continuous orchestration of data resources, AI systems, governance structures, human judgment, and strategic execution. The proposed framework contributes to digital business literature by explaining how AI-driven big data orchestration can improve decision quality, agility, competitiveness, innovation, operational efficiency, and sustainable digital value creation. In addition, the discussion is expanded to include cybersecurity, data privacy, secure data processing, and AI risk management as critical enablers of large-scale data-driven business systems.

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1. INTRODUCTION

The acceleration of digital transformation has fundamentally changed the way organizations design, execute, and evaluate business strategies. In contemporary digital markets, competition is no longer determined only by product quality, pricing, or operational scale, but also by the ability of firms to collect, process, interpret, and transform data into actionable business intelligence [1]. The increasing complexity of consumer behavior, market volatility, platform-based competition, and technological disruption has encouraged organizations to adopt more adaptive and data-driven strategic approaches. Within this context, big data and artificial

intelligence have emerged as two critical technological capabilities that can support business agility, strategic decision-making, and sustainable digital competitiveness [2, 3].

Big data provides organizations with large-scale, diverse, and high-velocity information generated from multiple digital sources, including customer transactions, social media interactions, mobile applications, enterprise systems, supply chains, and digital platforms [4]. However, the possession of large volumes of data does not automatically create strategic value. Many organizations still face difficulties in transforming raw data into meaningful insights due to data silos, poor data quality, weak governance, limited analytical capability, and fragmented digital infrastructure [5]. As a result, the strategic potential of big data often remains underutilized. Therefore, organizations need not only data availability, but also an integrated mechanism that enables data to be managed, analyzed, interpreted, and aligned with business objectives [6, 7].

Artificial intelligence strengthens the strategic value of big data by enabling advanced analytics, prediction, automation, personalization, anomaly detection, and intelligent decision support. Through machine learning, natural language processing, recommendation systems, and generative AI, organizations can identify hidden patterns, anticipate market changes, optimize operations, and improve customer experience. AI allows businesses to move beyond descriptive analysis toward predictive and prescriptive decision-making [8]. In this sense, AI functions as an intelligent engine that converts complex data into strategic knowledge. Nevertheless, AI adoption also introduces new managerial and ethical challenges, particularly related to transparency, accountability, bias, data privacy, cybersecurity, and the reliability of automated decisions [9].

The relationship between big data and artificial intelligence should not be viewed as a simple technological combination. Instead, it requires orchestration. Orchestration refers to the coordinated integration of data infrastructure, analytical capability, AI models, governance mechanisms, human expertise, and strategic business processes. Big data provides the empirical foundation for decision-making, while AI transforms that foundation into intelligent insights and adaptive responses. Without proper orchestration, big data may remain as unstructured digital assets, and AI may produce unreliable or misaligned outputs. Therefore, the orchestration of big data and AI becomes essential for organizations seeking to build adaptive digital business strategies that are responsive to environmental change [10].

Adaptive digital business strategy refers to an organization's capability to continuously adjust its strategic direction, business model, operational processes, and customer engagement mechanisms based on real-time data and intelligent insight. In highly dynamic markets, rigid strategic planning is no longer sufficient. Organizations must be able to sense market signals, respond to customer needs, predict risks, and redesign business actions quickly. The integration of big data and AI can support this adaptive capability by improving decision speed, strategic accuracy, operational efficiency, innovation capacity, and customer personalization. This makes AI-driven big data orchestration increasingly relevant for digital enterprises, startups, SMEs, e-commerce platforms, financial technology firms, and other data-intensive business ecosystems [11, 12].

Although previous studies have discussed the role of big data analytics and artificial intelligence in improving business performance, strategic management, and digital transformation, the existing literature often treats these two capabilities as separate technological assets. Limited attention has been given to how big data and AI can be orchestrated as an integrated strategic capability for adaptive digital business strategy [13]. Moreover, many studies emphasize technological benefits without sufficiently addressing governance, trustworthiness, human decision involvement, and strategic alignment. This creates a research gap in understanding how organizations can systematically connect data resources, AI capability, governance mechanisms, and adaptive strategy formation [14].

Based on this gap, this study aims to develop a conceptual understanding of how big data and artificial intelligence can be orchestrated to support adaptive digital business strategy. Specifically, this paper examines the role of big data capability, AI capability, governance mechanisms, and intelligent business insight in strengthening strategic adaptability [15, 16]. The novelty of this study lies in its orchestration-based perspective, which positions big data and artificial intelligence not as independent tools but as interdependent strategic capabilities that are integrated with governance mechanisms and organizational strategy to support adaptive digital business strategy. Unlike previous AI-based business strategy frameworks that typically focus on either predictive analytics, AI adoption, or big data analytics in isolation, this study explicitly integrates four dimensions big data capability, AI capability, governance mechanisms, and strategic adaptability into a unified conceptual orchestration model. This integration provides a more holistic explanation of how organizations continuously transform data into strategic actions under dynamic digital environments [17]. This

study contributes to the digital business literature by offering a conceptual framework for understanding how AI-driven big data orchestration can enhance business adaptability, competitiveness, and sustainable digital transformation. From a theoretical perspective, the proposed model can be more strongly positioned by integrating established foundations such as the Resource-Based View (RBV), Dynamic Capabilities Theory, and the Technology Organization Environment (TOE) framework, which collectively explain how organizations develop and leverage data and AI capabilities for strategic advantage [18].

2. LITERATURE REVIEW

2.1. Digital Business Strategy in a Dynamic Business Environment

Digital business strategy has become an essential approach for organizations operating in a rapidly changing and technology-driven environment. The growth of digital platforms, online transactions, mobile applications, and data-based services has transformed how companies create value, communicate with customers, manage operations, and compete in the market [19]. In this context, business strategy is no longer limited to long-term planning based on stable conditions. Instead, it must be adaptive, flexible, and responsive to changes in consumer behavior, market trends, technological disruption, and competitive pressure.

An adaptive digital business strategy refers to the ability of an organization to adjust its strategic direction, operational processes, and customer engagement mechanisms based on digital information and market signals. Organizations are required to sense environmental changes, interpret relevant information, and respond through appropriate business actions. This capability is important because digital markets are highly dynamic and uncertain. Companies that fail to adapt may experience declining competitiveness, reduced customer loyalty, and limited innovation capacity. Therefore, digital business strategy must be supported by strong data capability, intelligent technology, and effective governance mechanisms [20, 21].

In modern business, digital strategy is not only about adopting technology, but also about aligning digital resources with business objectives. Technology should support decision-making, improve efficiency, enhance customer experience, and create sustainable value. For this reason, big data and artificial intelligence have become important components in strengthening digital business strategy. Big data provides broad and diverse information about business activities, while artificial intelligence helps organizations transform that information into strategic insight and adaptive action [22].

2.2. Big Data as a Strategic Business Resource

Big data plays a foundational role in digital business strategy by enabling organizations to access and analyze diverse, high-volume information from multiple sources. However, its strategic value is fully realized only when integrated with analytical capabilities, particularly artificial intelligence, and supported by appropriate governance structures [23]. These sources may include customer transactions, social media interactions, mobile applications, supply chain systems, enterprise databases, e-commerce platforms, and digital service activities. Through big data, organizations can better understand customer preferences, identify market opportunities, evaluate business performance, detect operational risks, and support evidence-based decision-making [24].

However, the value of big data does not depend only on the volume of data collected. Its strategic value depends on how data are managed, processed, analyzed, and transformed into meaningful business insight [25]. Many organizations collect large amounts of data but still face difficulties in using it effectively because of data silos, inconsistent data quality, limited analytical capability, and weak data governance. If data are fragmented or poorly managed, they may not provide accurate and useful information for strategic decisions. Therefore, organizations need strong big data capability to ensure that data can be converted into business value [26, 27].

Big data capability includes data collection, data integration, data storage, data quality management, data analysis, and data utilization. In business strategy, this capability enables organizations to monitor changes in real time, recognize customer patterns, improve operational performance, and support more accurate decision-making. Big data can also help businesses develop more personalized services, improve market responsiveness, and anticipate future trends [28]. Thus, big data should be understood not only as a technological asset, but also as a strategic business resource that supports adaptability and competitiveness [29].

2.3. Artificial Intelligence for Intelligent Business Decision Making

Artificial intelligence strengthens the strategic function of big data by transforming complex data into intelligent insights, predictions, recommendations, and automated actions. In digital business, AI can be

applied in various areas, such as customer relationship management, marketing analytics, demand forecasting, recommendation systems, chatbot services, fraud detection, risk analysis, and business process automation [30]. These applications show that AI is not only a technical tool, but also an intelligent decision-support mechanism that helps organizations make faster and more accurate business decisions. AI enables organizations to move from descriptive analysis toward predictive and adaptive decision-making. Through AI-based analytics, companies can identify hidden patterns, predict customer needs, forecast market changes, and optimize business operations. For example, AI can help businesses recommend products to customers, adjust pricing strategies, identify potential risks, and automate repetitive processes. This capability allows organizations to respond more effectively to changing business conditions and customer expectations [31, 32].

Nevertheless, AI cannot operate effectively without reliable and relevant data. The quality of AI output depends on the quality of the data used in the system. Poor data quality may lead to inaccurate predictions, biased recommendations, and ineffective business decisions. Therefore, AI implementation must be supported by good data management, human oversight, and clear strategic alignment. In adaptive digital business strategy, AI should not replace managerial judgment, but should support human decision-makers by providing deeper insight, faster analysis, and more reliable recommendations.

2.4. Orchestration of Big Data and AI for Adaptive Strategy

The relationship between big data and artificial intelligence should be understood as an orchestration process. Orchestration refers to the coordinated integration of data resources, AI capability, human expertise, business processes, and governance mechanisms to achieve strategic objectives [33]. Big data provides the foundation for evidence-based decision-making, while AI transforms data into actionable insight. When both capabilities are integrated properly, organizations can build a continuous learning process that supports adaptive digital business strategy. The orchestration process begins with data collection from various digital sources. The data are then processed, cleaned, analyzed, and interpreted through AI-based systems. The results of this process can be used by decision-makers to formulate strategies, improve operations, personalize services, and respond to market changes. After strategic actions are implemented, new data are generated and used to improve future decisions. This cycle creates an adaptive mechanism in which organizations continuously learn from data and adjust their strategies based on changing conditions [34].

Orchestrating big data and AI also requires effective governance. Organizations must ensure that data are accurate, secure, consistent, and ethically managed. At the same time, AI systems must be transparent, accountable, reliable, and aligned with business values. Weak governance may create risks such as inaccurate decisions, privacy issues, algorithmic bias, cybersecurity threats, and reduced stakeholder trust. Therefore, the orchestration of big data and AI should not only focus on technological efficiency, but also on responsible and trustworthy implementation.

Based on this perspective, big data and artificial intelligence should not be treated as separate technological tools. They should be viewed as interdependent strategic capabilities that support adaptive digital business strategy. Big data provides the information foundation, AI generates intelligent insight, governance ensures responsible implementation, and business strategy converts insight into strategic action [35]. Through this orchestration, organizations can improve decision quality, business agility, customer value, operational efficiency, innovation, and sustainable digital competitiveness. This study contributes to the achievement of several Sustainable Development Goals (SDGs). First, it aligns with SDG 9 (Industry, Innovation, and Infrastructure) by strengthening the role of big data and artificial intelligence as digital infrastructure that supports innovation, intelligent systems, and adaptive digital transformation in business environments. Second, it supports SDG 8 (Decent Work and Economic Growth) by enhancing organizational efficiency, productivity, and competitiveness through AI-driven big data orchestration, which contributes to sustainable and technology-enabled economic growth.

Furthermore, the study is also relevant to SDG 16 (Peace, Justice and Strong Institutions) through its emphasis on data governance, cybersecurity, transparency, accountability, and ethical AI usage in large-scale digital business systems. By integrating governance mechanisms into AI and big data ecosystems, the proposed framework helps ensure secure, responsible, and trustworthy digital decision-making processes [36, 37].

Overall, the integration of big data and artificial intelligence in this study not only advances technological and managerial innovation but also supports the development of a secure, inclusive, and sustainable digital economy.

3. METHODOLOGY

3.1. Research Design

This study employed a qualitative conceptual research design based on a structured literature review and thematic synthesis. This method was selected because the main objective of the study is to develop a conceptual understanding of how big data and artificial intelligence can be orchestrated to support adaptive digital business strategy. Rather than testing statistical relationships between variables, this study focuses on identifying, interpreting, and integrating key concepts from previous studies related to big data capability, artificial intelligence capability, digital business strategy, governance, and business adaptability [38].

A conceptual research design is appropriate for this study because the relationship between big data and artificial intelligence in business strategy is still developing and requires deeper theoretical integration. Many organizations have adopted big data and AI technologies, but the strategic mechanism that connects these technologies with adaptive business decision-making remains fragmented. Therefore, this study uses a literature-based approach to construct a conceptual framework that explains how big data and AI can function as interdependent strategic capabilities in digital business environments.

3.2. Data Sources and Selection Criteria

The data used in this study were obtained from secondary sources, including peer-reviewed journal articles, conference papers, academic books, and reputable institutional reports related to artificial intelligence, big data analytics, digital business strategy, business intelligence, data governance, and adaptive decision-making. The reviewed literature was selected based on its relevance to the research topic and its contribution to understanding the integration of big data and AI in business contexts.

The selection process focused on literature that discusses at least one of the following themes: big data capability, AI adoption in business, digital transformation, business analytics, adaptive strategy, intelligent decision support, data governance, AI governance, and digital business performance. Priority was given to recent studies published between 2022 and 2026 to ensure that the analysis reflects current developments in artificial intelligence, big data, and digital business strategy. Older literature was considered only when it provided foundational theoretical concepts related to digital strategy, organizational capability, or strategic adaptability [39].

The inclusion criteria for the literature were as follows. First, the publication must be relevant to big data, artificial intelligence, digital business, or adaptive strategy. Second, the publication must discuss business, organizational, managerial, or strategic implications. Third, the publication must provide conceptual, empirical, or practical insights that support the development of the proposed framework. Meanwhile, literature was excluded if it focused only on technical algorithm development without business relevance, discussed AI or big data outside organizational contexts, or did not provide sufficient connection to digital strategy.

3.3. Data Analysis Technique

Data were analyzed using thematic synthesis. This technique was used to identify recurring themes, patterns, and conceptual relationships across the reviewed literature. The analysis began by reading and examining selected publications to identify key concepts related to big data capability, artificial intelligence capability, governance mechanisms, intelligent business insight, and adaptive digital business strategy [40].

After the key concepts were identified, they were grouped into several main themes. The first theme was big data as a strategic business resource, which explains how data can support decision-making, market sensing, customer understanding, and operational improvement. The second theme was artificial intelligence as an intelligent decision mechanism, which explains how AI transforms data into prediction, recommendation, automation, and strategic insight. The third theme was orchestration, which explains how big data and AI must be integrated with business processes, human expertise, and governance. The fourth theme was adaptive digital business strategy, which explains how organizations use intelligent insight to respond to market change, improve competitiveness, and sustain digital transformation.

Thematic synthesis was considered suitable because this study aims to develop an integrated conceptual explanation rather than measure numerical relationships. Through this process, the study was able to synthesize different perspectives from the literature and convert them into a coherent conceptual framework [41, 42]. The analysis emphasized how each concept contributes to the overall orchestration of big data and artificial intelligence in adaptive digital business strategy.

3.4. Conceptual Framework Development

Based on the thematic synthesis, this study developed a conceptual framework that connects big data capability, artificial intelligence capability, governance mechanisms, intelligent business insight, and adaptive digital business strategy. The framework was constructed by interpreting the logical relationship among these concepts. Big data capability is positioned as the foundation that provides diverse and dynamic information for business analysis. Artificial intelligence capability is positioned as the analytical engine that transforms data into predictions, recommendations, and intelligent insights. Governance mechanisms are positioned as supporting elements that ensure data and AI are used responsibly, securely, and transparently. The conceptual framework assumes that adaptive digital business strategy emerges from the orchestration of data resources, artificial intelligence systems, managerial decision-making, and governance mechanisms within an integrated digital ecosystem. In practical implementation, this orchestration can be operationalized through a structured big data pipeline consisting of data ingestion from heterogeneous sources (e.g., transactional systems, IoT devices, and digital platforms), data storage in scalable data lakes or distributed databases, and data preprocessing steps such as cleaning, transformation, and integration. In this process, big data enables organizations to sense changes in the business environment, while AI helps interpret those changes and recommend appropriate responses. Governance ensures that the process remains reliable, accountable, and aligned with organizational objectives. As a result, the orchestration of big data and AI can improve decision quality, business agility, customer responsiveness, operational efficiency, innovation, and sustainable digital competitiveness. This methodological approach allows the study to contribute theoretically and practically. Theoretically, it provides an integrated perspective on the relationship between big data, AI, and adaptive digital business strategy. Practically, it offers a conceptual direction for organizations seeking to use big data and AI not merely as technological tools, but as strategic capabilities that support continuous adaptation in digital business environments.

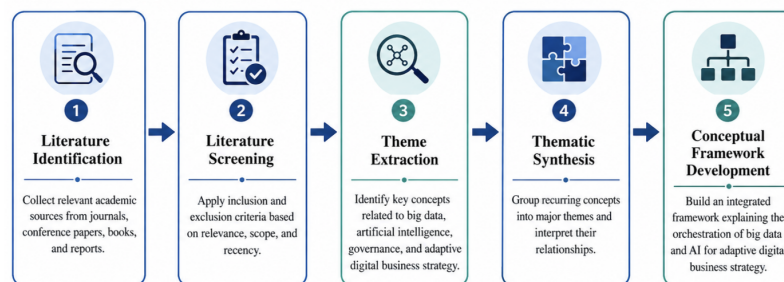


Figure 1. Research Workflow of Structured Literature Review and Thematic Synthesis

Figure 1 illustrates the research workflow used in this study to develop the conceptual framework of big data and artificial intelligence orchestration for adaptive digital business strategy. The process begins with literature identification, in which relevant academic sources from journals, conference papers, books, and institutional reports are collected. The next stage is literature screening, where the selected sources are evaluated based on relevance, scope, and recency. After that, theme extraction is conducted to identify key concepts related to big data, artificial intelligence, governance, and adaptive digital business strategy. These concepts are then analyzed through thematic synthesis to group recurring ideas into major themes and interpret their relationships. Finally, the synthesized themes are used to develop an integrated conceptual framework that explains how big data and AI can be orchestrated to support adaptive digital business strategy [43].

4. RESULTS AND DISCUSSION

4.1. Thematic Findings of Big Data and AI Orchestration

The thematic synthesis shows that the orchestration of big data and artificial intelligence is not merely a technological integration, but a strategic process that connects data resources, intelligent analytics, governance mechanisms, and business decision-making. The reviewed concepts indicate that big data and AI have different but complementary roles in adaptive digital business strategy. Big data provides the foundation for understanding business conditions, while artificial intelligence transforms data into predictions, recommendations, automation, and actionable insights [44].

The first major finding is that big data capability functions as a strategic foundation for digital business adaptation. Organizations can use big data to identify customer behavior, market trends, operational patterns, and potential business risks. However, data alone does not automatically produce business value. Data must be properly collected, integrated, cleaned, analyzed, and interpreted before it can support strategic decisions. This finding confirms that big data should not be treated only as a technological asset, but as a strategic business resource that requires managerial capability and governance.

The second finding is that artificial intelligence strengthens the value of big data by enabling intelligent decision-making. AI allows organizations to process complex data more efficiently and generate deeper insights that are difficult to obtain through conventional analysis. Through predictive analytics, recommendation systems, automation, and intelligent monitoring, AI helps businesses improve decision speed, customer responsiveness, operational efficiency, and innovation [45, 46]. Nevertheless, AI performance depends heavily on the quality and relevance of the data used. Poor data quality may produce inaccurate predictions, biased outputs, and ineffective strategic decisions.

The third finding is that governance plays a central role in ensuring responsible orchestration. The use of big data and AI in business strategy creates risks related to privacy, security, bias, transparency, accountability, and decision reliability. Therefore, organizations need governance mechanisms to ensure that data and AI systems are trustworthy and aligned with business objectives. Governance does not reduce innovation; rather, it supports sustainable innovation by increasing confidence in data-driven and AI-supported decisions [47].

The fourth finding is that adaptive digital business strategy emerges when big data, AI, governance, and human decision-making are integrated into a continuous strategic learning cycle. This cycle allows organizations to collect data from business activities, analyze it through AI systems, interpret the results as business insight, implement strategic actions, and use new data to improve future decisions. This process enables organizations to become more responsive to environmental change and more capable of maintaining digital competitiveness.

Table 1. Thematic Synthesis Findings and Strategic Implications

Thematic Finding	Explanation	Strategic Implication
Big data as strategic foundation	Big data provides diverse information from customers, markets, operations, and digital platforms	Organizations should strengthen data integration and data quality management
AI as intelligent decision engine	AI transforms data into predictions, recommendations, and automation	Businesses should use AI to improve decision speed, personalization, and efficiency
Governance as trust mechanism	Governance ensures responsible, secure, and transparent use of data and AI	Firms should develop policies for privacy, accountability, bias control, and monitoring
Orchestration as strategic integration	Big data, AI, governance, and human decision-making must be integrated	Management should align technology initiatives with business objectives
Adaptive strategy as business outcome	Intelligent insight supports flexible and responsive strategic actions	Organizations can improve agility, innovation, competitiveness, and sustainability

Table 1 presents the thematic synthesis findings that explain the strategic role of big data and artificial intelligence orchestration in supporting adaptive digital business strategy. The table shows that big data functions as a strategic foundation by providing diverse information from customers, markets, operations, and digital platforms, which requires strong data integration and data quality management. Artificial intelligence then acts as an intelligent decision engine by transforming data into predictions, recommendations, and automation to improve decision speed, personalization, and efficiency. In addition, governance is identified as a trust mechanism that ensures responsible, secure, and transparent use of data and AI through policies related to privacy, accountability, bias control, and monitoring. The table also highlights orchestration as a strategic integration process that connects big data, AI, governance, and human decision-making with business objectives. Ultimately, adaptive strategy emerges as the main business outcome, enabling organizations to improve agility, innovation, competitiveness, and sustainability in dynamic digital business environments [48].

4.2. Big Data as the Foundation of Adaptive Digital Business Strategy

Big data contributes to adaptive digital business strategy by improving the ability of organizations to sense and understand changes in the business environment. In digital business ecosystems, data are generated continuously from customer transactions, online interactions, supply chain systems, enterprise platforms, social media, and digital services. These data sources provide important information about customer needs, market movements, operational performance, and business opportunities [49].

The strategic role of big data can be seen in its ability to support evidence-based decision-making. Organizations that are able to manage big data effectively can reduce uncertainty because strategic decisions are based on real-time and relevant information. For example, customer data can help businesses understand purchasing behavior, service preferences, and satisfaction patterns. Operational data can help companies identify inefficiencies, monitor performance, and improve internal processes [50, 51]. Market data can help organizations detect emerging trends and adjust their business strategies more quickly. However, the discussion also shows that the strategic value of big data depends on organizational readiness. Data must be accurate, accessible, integrated, and relevant to business objectives. When data are stored in separate systems or managed without clear standards, organizations may experience difficulties in generating reliable insights. Therefore, big data capability must include not only technological infrastructure, but also data quality management, analytical skills, data culture, and managerial commitment [52].

In adaptive digital business strategy, big data acts as the sensing mechanism. It enables organizations to observe internal and external changes before making strategic responses. This sensing capability is important because digital markets change rapidly, and organizations must respond before opportunities disappear or risks become larger. Thus, big data becomes the first stage in the orchestration process because it provides the information foundation needed for AI-based analysis and strategic adaptation.

4.3. Artificial Intelligence as an Intelligent Decision Engine

Artificial intelligence becomes the analytical engine that transforms big data into intelligent business insight. While big data provides information, AI enables organizations to identify patterns, make predictions, generate recommendations, and automate decision-support processes. This role is important because the complexity and speed of digital data often exceed the capacity of manual analysis. AI helps organizations interpret data more quickly and convert it into strategic actions [53]. AI supports adaptive digital business strategy through several functions. First, AI improves prediction by forecasting demand, customer behavior, market changes, and operational risks. Second, AI supports personalization by recommending products, services, and content based on customer preferences. Third, AI improves efficiency by automating repetitive processes and optimizing resource allocation. Fourth, AI strengthens decision support by providing managers with relevant insights for strategic planning and operational control [54, 55].

The discussion indicates that AI should not be positioned as a replacement for human decision-makers. Instead, AI should be understood as a decision-support mechanism that strengthens managerial judgment. Business strategy requires not only algorithmic output, but also human interpretation, ethical consideration, contextual understanding, and organizational responsibility. Therefore, the most effective use of AI in digital business is human-centered, where AI provides analytical intelligence and humans provide strategic direction [56].

AI also creates strategic risks when it is not properly governed. Inaccurate data, weak model validation, lack of transparency, and limited human oversight may result in unreliable business decisions. For this reason, AI capability must be connected with data governance and business governance. The quality of AI output depends on the quality of data input, the appropriateness of the model, and the ability of decision-makers to interpret AI-generated insights responsibly.

4.4. Governance as an Enabler of Trustworthy Digital Strategy

The orchestration of big data and AI requires strong governance to ensure that digital business strategy remains reliable, responsible, and trustworthy. Governance provides rules, standards, and control mechanisms for managing data and AI systems. In this study, governance is interpreted as an enabling mechanism that connects technological capability with strategic accountability [57].

Data governance is important because big data must be accurate, secure, consistent, and ethically managed. Without data governance, organizations may face problems such as data duplication, inconsistent information, privacy violations, and poor decision quality. AI governance is also important because AI systems may produce biased, unclear, or unreliable outputs if they are not monitored properly. Therefore, governance

must cover the entire data and AI lifecycle, from data collection and processing to model development, deployment, monitoring, and evaluation. Governance also improves strategic trust. In digital business, managers need to trust the data and AI systems used to support decisions. Customers and stakeholders also need confidence that their data are used responsibly and securely. When governance is weak, the organization may lose stakeholder trust, even if its technology is advanced [58].

Therefore, responsible governance strengthens the legitimacy of AI-based and data-driven business strategies. The discussion suggests that governance should not be viewed as a barrier to digital innovation. Instead, governance enables sustainable innovation by reducing risks and improving decision reliability. Organizations that combine innovation with governance are more likely to develop adaptive strategies that are not only fast and efficient, but also ethical, accountable, and sustainable.

4.5. Proposed Orchestration Model for Adaptive Digital Business Strategy

Based on the thematic synthesis, this study proposes that adaptive digital business strategy can be developed through the orchestration of five main components: big data capability, artificial intelligence capability, governance mechanisms, intelligent business insight, and strategic adaptation. These components are interconnected and form a continuous strategic process.

Big data capability serves as the input foundation. It allows organizations to collect and manage information from various digital sources. Artificial intelligence capability functions as the analytical engine that processes data into predictions, recommendations, and automation. Governance mechanisms ensure that data and AI are used responsibly, securely, and transparently. Intelligent business insight becomes the output of AI-driven analysis. Finally, adaptive digital business strategy represents the organization’s ability to transform insight into strategic action.

Table 2. The Proposed Orchestration Model

Component	Strategic Role	Contribution to Adaptive Strategy
Big Data Capability	Provides diverse and dynamic business data	Enables market sensing and evidence-based decision-making
Artificial Intelligence Capability	Converts data into predictions and recommendations	Improves decision speed, accuracy, and automation
Governance Mechanisms	Ensures responsible data and AI use	Strengthens trust, accountability, and decision reliability
Intelligent Business Insight	Produces actionable strategic knowledge	Supports interpretation of market and operational conditions
Adaptive Digital Business Strategy	Converts insight into strategic action	Enhances agility, competitiveness, and sustainability

Table 2 demonstrates that adaptive strategy development is not generated solely through the adoption of advanced technologies, but rather emerges from the continuous interaction between data resources, artificial intelligence capabilities, governance mechanisms, human decision-making, and strategic execution. The findings indicate that big data provides the foundation for acquiring comprehensive and diverse business insights, while AI functions as an intelligent mechanism that transforms these data resources into predictive analysis, recommendations, and automated decision support. However, the effectiveness of AI-driven strategies depends strongly on appropriate governance structures that ensure data quality, security, transparency, and responsible utilization. Furthermore, human judgment remains an essential component in interpreting AI-generated insights and aligning technological capabilities with organizational objectives. Through this orchestration process, organizations can continuously learn from evolving data patterns, identify emerging opportunities, respond to environmental changes, and refine their strategic actions. Therefore, the proposed model provides a conceptual explanation of how businesses can integrate digital resources into a coordinated capability that enhances strategic adaptability, improves decision-making effectiveness, and supports sustainable competitive advantage in dynamic digital environments.

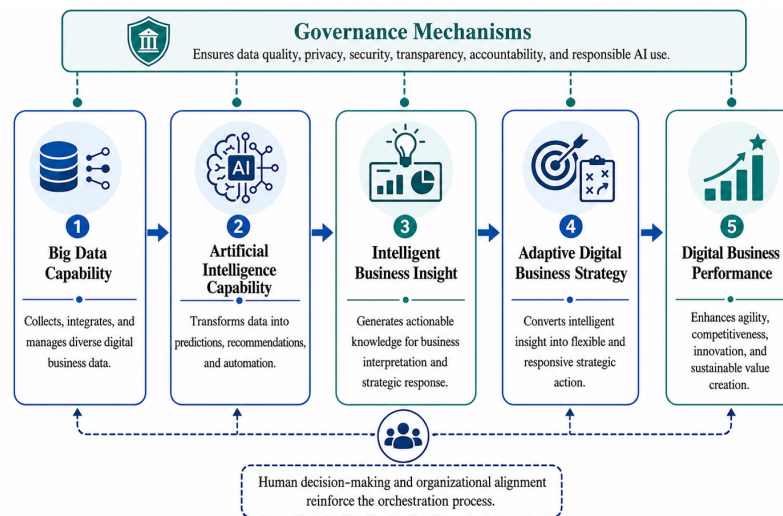


Figure 2. Conceptual Framework of Big Data and AI Orchestration for Adaptive Digital Business Strategy

Figure 2 illustrates the conceptual framework proposed in this study for explaining how big data and artificial intelligence can be orchestrated to support adaptive digital business strategy. The framework shows that big data capability serves as the foundational input by enabling organizations to collect, integrate, and manage diverse digital business data, while artificial intelligence capability transforms these data into predictions, recommendations, and automation. The resulting intelligent business insight then supports the formulation of adaptive digital business strategy, which allows organizations to respond flexibly and effectively to changing market conditions. This strategic process ultimately contributes to improved digital business performance in terms of agility, competitiveness, innovation, and sustainable value creation. In addition, the framework emphasizes that governance mechanisms play an overarching role in ensuring data quality, privacy, security, transparency, accountability, and responsible AI use, while human decision-making and organizational alignment reinforce the orchestration process to ensure that technological capabilities remain aligned with business objectives.

5. MANAGERIAL IMPLICATIONS

The findings of this study provide several important managerial implications for organizations seeking to strengthen adaptive digital business strategy through big data and artificial intelligence orchestration. First, managers should recognize that big data and AI should not be implemented as isolated technological initiatives, but as integrated strategic capabilities that support continuous learning and decision adaptation. Organizations need to develop strong data management capabilities, including data integration, data quality control, and scalable data infrastructure, to ensure that AI systems receive accurate and reliable information for generating meaningful business insights.

Second, managers should focus on developing AI-driven decision support mechanisms that complement human expertise rather than replacing managerial judgment. The findings indicate that AI can improve prediction, personalization, automation, and operational efficiency; however, strategic decisions still require human interpretation, contextual understanding, and alignment with organizational objectives. Therefore, organizations should invest in employee digital competencies and establish collaboration between human intelligence and artificial intelligence to maximize strategic value.

Third, organizations should strengthen governance mechanisms to ensure that big data and AI adoption remains trustworthy, secure, and responsible. Managers need to establish policies related to data privacy, cybersecurity, transparency, accountability, bias mitigation, and continuous monitoring of AI systems. Effective governance enables organizations to reduce technological risks while maintaining stakeholder trust and supporting sustainable digital innovation.

Finally, the proposed orchestration perspective provides practical guidance for business leaders in improving agility, competitiveness, and sustainable value creation. By integrating big data capability, AI capability, governance structures, and strategic execution, organizations can enhance their ability to sense market

changes, respond to customer needs, optimize operations, and develop adaptive strategies in dynamic digital environments. This implication is particularly relevant for digital businesses, startups, SMEs, e-commerce platforms, and other data-intensive organizations that rely on rapid innovation and data-driven decision-making.

6. CONCLUSION

This study concludes that the orchestration of big data and artificial intelligence plays a strategic role in supporting adaptive digital business strategy. Big data provides the foundational resource for understanding customer behavior, market dynamics, operational performance, and emerging business risks, while artificial intelligence transforms these data into predictions, recommendations, automation, and intelligent business insights. The findings indicate that the strategic value of big data and AI does not emerge from their separate implementation, but from their coordinated integration within business processes, governance structures, and managerial decision-making. Therefore, big data and AI should be understood as interdependent strategic capabilities that enable organizations to respond more effectively to dynamic digital business environments.

The conceptual analysis further shows that governance mechanisms are essential in ensuring that the use of big data and AI remains reliable, responsible, and aligned with organizational objectives. Governance supports data quality, privacy, security, transparency, accountability, and responsible AI implementation, which are necessary to build trust in AI-supported business decisions. In addition, human decision-making and organizational alignment remain important because adaptive digital business strategy cannot depend solely on automated systems. AI-generated insights must be interpreted through managerial judgment, ethical consideration, and strategic relevance so that technological capabilities can be converted into meaningful business actions.

Overall, this study contributes to the digital business literature by proposing an orchestration-based perspective that connects big data capability, artificial intelligence capability, governance mechanisms, intelligent business insight, and adaptive digital business strategy. The proposed framework highlights that organizations can improve agility, competitiveness, innovation, operational efficiency, and sustainable value creation when data and AI are integrated into a continuous strategic learning process. Future research is recommended to empirically test this conceptual framework using quantitative approaches such as SEM-PLS or qualitative case studies across digital businesses, startups, SMEs, e-commerce platforms, and other data-intensive industries.

7. DECLARATIONS

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7.2. Author Contributions

Conceptualization: MH; Methodology: SA; Software: ST; Validation: FA and MR; Formal Analysis: MH and SA; Investigation: ST; Resources: FA; Data Curation: MR; Writing Original Draft Preparation: MH and MR; Writing Review and Editing: ST and FA; Visualization: MR; All authors, MH, SA, ST, FA and MR have read and agreed to the published version of the manuscript.

7.3. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

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7.5. Declaration of Conflicting Interest

The authors declare that they have no conflicts of interest, known competing financial interests, or personal relationships that could have influenced the work reported in this paper.

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