



Artificial Intelligence in the Data Economy: A Conceptual and Thematic Review of Business Model Transformations

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Abstract— This study presents a conceptual and thematic review of how artificial intelligence (AI) transforms business models within the data-driven economy. Drawing on a structured four-phase methodology—comprising conceptual framing, systematic literature selection, thematic analysis, and framework development—the research synthesizes insights from peer-reviewed sources published between 2015 and 2025. The findings reveal three dominant dimensions of AI-enabled transformation: technological enablement, data-driven value creation, and organizational reconfiguration. AI technologies such as machine learning, natural language processing, and intelligent automation are shown to enhance operational efficiency, strategic agility, and sustainability outcomes across sectors including education, manufacturing, and urban infrastructure. Despite its transformative potential, the literature reveals gaps in longitudinal analysis, trust dynamics, and the integration of AI with circular economy principles. The study proposes a multi-dimensional conceptual framework grounded in General-Purpose Technology theory, Schumpeterian innovation, and systems thinking. Practical implications highlight the need for strategic alignment, capability development, and cross-sector collaboration to optimize AI adoption. This review contributes to the academic discourse by clarifying the systemic role of AI in business model innovation and identifying pathways for future empirical research and managerial application.

Index Terms— Artificial Intelligence, Business Model Innovation, Conceptual Framework, Data Economy

I. INTRODUCTION

The integration of artificial intelligence (AI) and digital technologies into postsecondary education and business ecosystems has become a defining feature of contemporary digital transformation. AI engineering, in particular, is reshaping educational institutions by enabling personalized learning environments, automating administrative processes, and enhancing pedagogical outcomes through intelligent systems[1], [2]. These developments reflect a broader shift toward data-driven decision-making and agile innovation, where digital technologies serve as strategic assets in reconfiguring traditional organizational models. As digital infrastructures evolve, they increasingly function as core components of business processes, facilitating operational efficiency, customer engagement, and adaptive value creation[2], [3]. The growing reliance on AI and digital technologies underscores their materiality as foundational elements in shaping the future of institutional and corporate performance. In postsecondary education, the deployment of AI-driven systems not only enhances learning outcomes but also redefines the strategic role of universities in a competitive global knowledge economy. Similarly, in business ecosystems, digital transformation is no longer a peripheral initiative but a central driver of innovation, resilience, and long-term value creation. The importance of this subject lies in its capacity to bridge technological advancement with organizational strategy, enabling institutions to respond effectively to dynamic market conditions, regulatory pressures, and evolving stakeholder expectations.

Moreover, the materiality of AI integration is evident in its measurable impact on productivity, cost structures, and decision-making quality. Organizations that successfully embed AI into their business models demonstrate superior adaptability, data fluency, and customer-centricity—traits that are increasingly critical in volatile and complex environments. As digital

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infrastructures become more intelligent and interconnected, they facilitate not only operational optimization but also the emergence of new business logics, such as platform-based ecosystems and circular economy models. Understanding these transformations is essential for scholars, practitioners, and policymakers seeking to harness AI's potential while navigating its ethical, strategic, and structural implications. Thus, the subject holds both theoretical significance and practical urgency in the context of contemporary digital transformation.

In parallel, the emergence of circular economy principles has prompted a reevaluation of how digital technologies contribute to sustainable product lifecycles and resource optimization. Digital platforms, AI-driven analytics, and intelligent tracking systems enable closed-loop production models, thereby supporting environmental goals and economic resilience[1], [2]. The role of business models in this context is critical, as organizations must align technological capabilities with sustainability objectives to remain competitive. High-tech companies, in particular, are adopting innovative configurations that integrate digitalization with circularity, fostering new pathways for value delivery and stakeholder collaboration[2], [3]. These configurations often involve the deployment of AI-enabled systems that support closed-loop production, intelligent resource tracking, and predictive maintenance, thereby aligning operational efficiency with environmental stewardship. By embedding circular economy principles into their digital strategies, high-tech firms are not only reducing waste and extending product lifecycles but also creating adaptive business models that respond to evolving regulatory, market, and consumer demands. This convergence of digitalization and circularity reflects a broader paradigm shift in how value is conceptualized and delivered—moving from linear, consumption-driven models to regenerative, data-informed ecosystems. As such, the strategic integration of AI and digital technologies becomes a critical lever for innovation, resilience, and sustainable growth in technologically intensive sectors.

This study is grounded in a conceptual framework that synthesizes theories from digital transformation, innovation management, and sustainability science. At its foundation, the framework views AI and digital technologies as general-purpose technologies (GPTs) capable of reshaping institutional structures and economic paradigms[4], [5]. Drawing on Schumpeterian innovation theory, technological disruption is positioned as a catalyst for business model renewal, where firms reconfigure their value propositions, revenue mechanisms, and customer interfaces in response to digital stimuli[5], [6]. Building upon these theoretical foundations, the framework also incorporates principles from sustainability science to examine how AI-enabled digitalization contributes to circular economy models and long-term resource optimization. This interdisciplinary approach allows for a nuanced understanding of how technological capabilities intersect with strategic intent and environmental imperatives in shaping contemporary business models. By integrating these perspectives, the study positions AI not only as a driver of efficiency and innovation but also as a transformative force in redefining organizational purpose and stakeholder value across sectors. The conceptual synthesis thus provides a robust lens for analyzing the systemic implications of AI adoption in high-tech environments, educational institutions, and smart infrastructure ecosystems.

In light of this framework, the central research question guiding this study is: How do artificial intelligence and digital technologies, as general-purpose innovations, enable the transformation of business models in the data-driven economy, particularly in relation to strategic agility, value creation, and sustainability integration?

This question aims to uncover the mechanisms through which AI reshapes organizational structures and strategic configurations, while also identifying the conditions necessary for its effective and ethical deployment in diverse economic contexts. **In the following sections, the research methodology, findings, and the discussion and conclusion will be presented.**

II. Research Methodology

In the first phase, foundational constructs related to AI technologies and the data economy were defined and contextualized. This included an examination of AI capabilities such as machine learning, natural language processing, and intelligent automation, alongside principles of data-centric value creation and digital business model innovation. The conceptual framing was informed by established theories in strategic management (Teece, 2018), digital transformation (Brynjolfsson & McAfee, 2014), and business model innovation (Foss & Saebi, 2017).

This study adopts a conceptual and thematic literature review methodology to investigate the transformative role of artificial intelligence (AI) in shaping business models within the data-driven economy. The research process is structured into four integrated phases to ensure analytical rigor and comprehensive coverage of the topic. **The thematic analysis in this study was conducted through a structured qualitative coding process that ensured methodological rigor and conceptual clarity. Initial codes were generated to capture recurring ideas across the selected literature, which were then organized into higher-order categories through iterative refinement. This multi-stage approach facilitated the identification of dominant themes and conceptual linkages, allowing for the synthesis of insights across strategic, technological, and organizational dimensions. To strengthen reliability, coding decisions were cross-validated and reconciled through systematic comparison, thereby ensuring that the emergent themes were both defensible and replicable. The resulting thematic categories provide a coherent foundation for developing a conceptual framework that illustrates the transformative role of artificial intelligence in business model innovation within the data-driven economy.**

A systematic search was conducted across four major academic databases: Scopus, Web of Science (WoS), IEEE Xplore, and

ScienceDirect. The search strategy combined Boolean operators and targeted keywords including: “artificial intelligence” AND “business model innovation” AND “data economy” AND “digital transformation” AND “intelligent enterprise.”

- **Inclusion Criteria:**

- Peer-reviewed journal articles, conference proceedings, and high-impact white papers
- Published between 2015 and 2025
- Explicit focus on AI applications in business model design, transformation, or innovation
- English-language publications
- Conceptual, empirical, or mixed-method studies relevant to strategic, technological, or organizational dimensions

- **Exclusion Criteria:**

- Studies with purely technical or algorithmic focus lacking business model relevance
- Non-English publications
- Duplicate records across databases
- Editorials, book reviews, and non-peer-reviewed content

The PRISMA flow diagram (Figure X) was used to document the screening process, including identification, screening, eligibility, and final inclusion stages. A total of $n = [12]$ articles were retained for thematic analysis after applying the criteria.

The first phase involves conceptual framing, wherein foundational constructs related to AI technologies and the data economy are defined and contextualized. This includes an examination of AI capabilities such as machine learning, natural language processing, and intelligent automation, alongside the principles of data-centric value creation and digital business model innovation. The conceptual framework is informed by established theories in strategic management, information systems, and digital transformation.

In the second phase, a systematic literature search was conducted across major academic databases including Scopus, Web of Science, IEEE Xplore, and ScienceDirect. The search utilized targeted keywords such as “artificial intelligence,” “data economy,” “business model innovation,” “digital transformation,” and “intelligent enterprise.” The inclusion criteria focused on peer-reviewed journal articles, conference proceedings, and high-impact white papers published between 2015 and 2025 that explicitly address AI applications in business model design or transformation. Studies with a purely technical focus, non-English publications, and duplicate entries were excluded to maintain relevance and quality.

The third phase consists of thematic analysis, in which the selected literature was examined using qualitative coding techniques to identify recurring patterns, dominant themes, and conceptual linkages. The analysis revealed three overarching thematic categories: AI as a business enabler, data-driven value creation, and organizational transformation. These themes were synthesized to map the interconnections between AI technologies and core business model components such as value proposition, revenue streams, and customer interface.

The final phase involves the development of a conceptual framework that illustrates the influence of AI on business model transformation in the context of the data economy. This framework integrates technological, strategic, and organizational dimensions to provide a holistic perspective on AI-enabled business innovation. The study also identifies gaps in the existing literature and proposes future research directions, offering practical insights for managers seeking to optimize AI adoption in their organizations.

III. Findings

The thematic synthesis of the reviewed literature reveals three dominant dimensions through which artificial intelligence (AI) and digital technologies are transforming business models in the data economy: technological enablement, data-driven value creation, and organizational transformation. These dimensions are interrelated and collectively illustrate the systemic impact of AI on strategic, operational, and sustainability-oriented aspects of modern enterprises.

First, technological enablement emerges as a foundational driver of business model innovation. AI technologies such as machine learning, natural language processing, and intelligent automation are widely adopted to enhance operational efficiency, reduce transaction costs, and improve decision-making accuracy. In postsecondary education, AI engineering supports personalized learning, predictive analytics, and administrative automation, thereby contributing to institutional competitiveness and digital maturity[1], [2]. In business contexts, these technologies facilitate real-time data processing, customer segmentation, and adaptive service delivery, enabling firms to respond dynamically to market changes.

Second, the literature highlights the strategic role of data-driven value creation in reshaping business models. Organizations increasingly leverage digital platforms and big data analytics to monetize information assets, optimize customer experiences, and build scalable ecosystems. This shift is particularly evident in high-tech companies, where platform-based models and data-centric strategies enable new forms of value proposition and revenue generation[6], [7]. The integration of AI into these models allows for continuous learning and refinement, enhancing both operational agility and strategic foresight.

Third, organizational transformation is identified as a critical enabler of sustainable digitalization. AI adoption necessitates the reconfiguration of internal capabilities, strategic alignment across departments, and the development of collaborative ecosystems. Trust dynamics, especially in high-barrier environments, play a moderating role in AI implementation, with government involvement influencing adoption rates and stakeholder confidence[2], [5]. Moreover, the transition toward circular economy principles is facilitated by AI-enabled systems that support closed-loop production, intelligent resource tracking, and eco-design. Business models in smart-city waste management, for example, demonstrate how digital technologies can be aligned with sustainability goals to achieve long-term resilience and stakeholder value.

Overall, the findings suggest that AI is not merely a technological tool but a strategic asset that redefines the logic of business model design and execution. Its impact spans operational efficiency, strategic innovation, and environmental sustainability, positioning AI as a central component of organizational transformation in the data economy. The conceptual framework developed in this study provides a structured lens for understanding these dynamics and offers a foundation for future empirical research and managerial application.

Table 1. Methodological Structure of the Conceptual and Thematic Review

Phase	Description	Purpose	Supporting References
Conceptual Framing	Definition and contextualization of key constructs: AI technologies, data economy, business models	Establish theoretical foundation and clarify scope	Brynjolfsson & McAfee (2014); Teece (2018)
Literature Selection	Systematic search across Scopus, WoS, IEEE Xplore, ScienceDirect using defined inclusion criteria	Ensure relevance, quality, and thematic alignment of sources	Foss & Saebi (2017); Bresciani et al. (2021)
Thematic Analysis	Qualitative coding to extract recurring themes and conceptual linkages	Identify dominant patterns and structure findings into coherent categories	Adholiya (2025); van Klyton et al. (2025)
Framework Development	Integration of themes into a multi-dimensional conceptual model	Synthesize insights and propose a holistic framework for AI-driven business transformation	Foss & Saebi (2017); Teece (2018)

Most Recent advancements in digitalization, paired with the growing demand for sustainable business models, position artificial intelligence (AI) as a pivotal enabler of circular business model innovation (CBMI) for industrial manufacturers. Research by Sjödin et al. (2023) delves into the role of AI competencies and dynamic capabilities in fostering innovation within these models, pointing to dynamic processes as an area that warrants further exploration[8]

In a complementary study, Secundo et al. (2025) present a systematic review highlighting the transformative capabilities of AI within innovation ecosystems. Their findings underline the necessity for firms to embrace novel organizational structures alongside sustainable business models, suggesting that innovation in business models goes beyond modifying existing practices to support sustainability efforts and the circular economy.[9]

Tutore et al. (2024) contribute to this discourse by proposing a theoretical framework that examines the impact of AI on actions related to the circular economy. Their research elucidates how AI can catalyze business model innovation, prompting organizations to adopt more circular practices. However, practical examples that illustrate these concepts could enhance understanding[10].

The analysis of AI-driven business models in the post-epidemic context by Lv et al. (2024) emphasizes the importance of aligning business model innovation with digital ecosystems, while pointing to the need for deeper insights into the social impacts of such innovations[11].

Montes-Pineda and Garrido-Yserte (2024) further explore how AI can facilitate the development of circular business models, stressing the significance of synergies between various conceptual frameworks. They acknowledge the need for stronger integrative connections that can enrich this area of study[12].

Finally, the focus on AI-driven innovations in small and medium-sized enterprises (SMEs) emerges as a crucial area for further investigation. Research that examines how AI can propel the evolution of business models within SMEs could vividly illustrate the contributions of AI technologies to the growth and sustainability of these entities.

In conclusion, it is increasingly clear that AI not only underpins circular business model innovation but also necessitates a deeper understanding of dynamic capabilities and existing ecosystems. These explorations not only clarify the function of AI in this context but also pinpoint gaps within the literature, thus paving the way for future research endeavors.

V. Discussion and Conclusion

This study has explored the transformative role of artificial intelligence (AI) within the data economy, emphasizing its impact on business model innovation across various sectors. Through a structured conceptual and thematic review, the findings reveal that AI functions not merely as a technological tool but as a strategic enabler of organizational agility, data-driven value creation, and sustainability-oriented transformation. The integration of AI into business processes—ranging from postsecondary education to smart-city infrastructure—demonstrates its capacity to reconfigure traditional models of value delivery and stakeholder engagement. This study, through a deep thematic review of 12 scholarly articles, aims to elucidate the transformative role of artificial intelligence in enabling technological advancement, data-driven value creation, and organizational reconfiguration within the evolving data economy.

The findings of this study underscore the multifaceted role of artificial intelligence (AI) in reshaping business models within the data economy. Through a structured thematic synthesis, three dominant dimensions emerged: technological enablement, data-driven value creation, and organizational transformation. These dimensions are not isolated; rather, they interact dynamically to influence strategic orientation, operational agility, and sustainability outcomes.

Technological enablement serves as a foundational layer, where AI tools such as machine learning, natural language processing, and intelligent automation are deployed to enhance efficiency, reduce transaction costs, and improve decision-making accuracy. In educational contexts, AI engineering supports personalized learning and predictive analytics, contributing to institutional competitiveness and digital maturity (Adholiya, 2025). In business environments, these technologies facilitate real-time data processing, customer segmentation, and adaptive service delivery, enabling firms to respond swiftly to market fluctuations (Brynjolfsson & McAfee, 2014).

The second dimension—data-driven value creation—reflects a strategic shift toward monetizing information assets and building scalable ecosystems. Organizations increasingly adopt platform-based models and big data analytics to generate new value propositions and revenue streams (Foss & Saebi, 2017; Bresciani et al., 2021). AI integration within these models allows for continuous learning and strategic foresight, reinforcing the logic of dynamic capabilities (Teece, 2018).

Organizational transformation, the third dimension, highlights the structural and cultural shifts required for sustainable digitalization. AI adoption necessitates reconfiguring internal capabilities, fostering cross-functional alignment, and cultivating trust—especially in high-barrier environments where government involvement plays a moderating role (van Klyton et al., 2025). Recent studies emphasize the role of AI in enabling circular business model innovation (CBMI), particularly through closed-loop production, intelligent resource tracking, and eco-design (Sjödin et al., 2023; Tutore et al., 2024). These capabilities align digitalization with environmental resilience and long-term stakeholder value.

However, several gaps persist in the literature. There is a notable lack of empirical research on the longitudinal impact of AI on business model adaptability and resilience, especially within small and medium-sized enterprises (SMEs). Montes-Pineda and Garrido-Yserte (2024) call for stronger integrative frameworks that connect AI engineering with sustainability outcomes, while Lv et al. (2024) highlight the need to explore the social implications of AI-driven innovation in post-pandemic digital ecosystems. Furthermore, Secundo et al. (2025) argue that innovation in business models requires more than technological upgrades—it demands novel organizational structures and ecosystem-level collaboration.

In sum, AI is not merely a tool for operational optimization; it is a strategic asset that redefines the architecture of business model design and execution. The conceptual framework developed in this study offers a structured lens for understanding these dynamics and provides a foundation for future empirical inquiry. Addressing the identified gaps through interdisciplinary research and context-sensitive analysis will be essential to fully realize AI's potential as a catalyst for sustainable and intelligent enterprise transformation.

One of the key strengths of this review lies in its multi-dimensional framework, which synthesizes technological, strategic, and environmental perspectives. By grounding the analysis in established theories such as General-Purpose Technology (GPT), Schumpeterian innovation, and systems theory, the study offers a robust conceptual lens for understanding AI-driven

transformation. Furthermore, the thematic categorization—comprising technological enablement, data-centric value creation, and organizational reconfiguration—provides clarity and coherence in mapping the diverse applications of AI across industries.

However, the study is not without limitations. First, the reliance on secondary sources restricts the ability to validate conceptual insights through empirical data. While the review draws from high-impact literature, the absence of primary data collection limits the granularity of sector-specific analysis. Second, the thematic synthesis, while comprehensive, may overlook emerging subfields or niche applications of AI that are underrepresented in current academic databases. Additionally, the review focuses predominantly on English-language publications, potentially excluding valuable regional perspectives, particularly from non-Western economies.

The analysis also reveals several gaps in the existing literature. Notably, there is limited research on the longitudinal impact of AI adoption on business model resilience and adaptability. Few studies address the dynamic interplay between AI capabilities and organizational learning over time. Moreover, while trust dynamics and government involvement are acknowledged as moderating factors, their influence on AI implementation in high-barrier environments remains underexplored. There is also a lack of integrative models that connect AI engineering in education with broader economic and sustainability outcomes.

From a practical standpoint, the findings offer actionable insights for managers, policymakers, and educators. Organizations seeking to leverage AI must prioritize strategic alignment, capability development, and cross-sector collaboration. The successful integration of AI requires not only technological investment but also cultural readiness and governance structures that support innovation. In educational contexts, AI engineering should be embedded within institutional strategies to enhance learning outcomes and operational efficiency. For policymakers, fostering trust and regulatory clarity is essential to accelerate AI adoption, particularly in sectors with high entry barriers.

In conclusion, this study contributes to the growing body of literature on digital transformation by offering a conceptual and thematic synthesis of how AI reshapes business models in the data economy. It highlights both the opportunities and challenges associated with AI integration and proposes a framework for future research and strategic application. Addressing the identified gaps through empirical studies and cross-disciplinary collaboration will be essential to fully realize the potential of AI as a catalyst for sustainable and intelligent enterprise transformation.

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