DIGITAL TRANSFORMATION AND EMERGING TECHNOLOGIES IN COMMERCE: A SYSTEMATIC LITERATURE REVIEW OF TRENDS, CHALLENGES, AND STRATEGIC IMPLICATIONS

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Abstract

This systematic literature review explores the transformative impact of digital transformation (DT) and emerging technologies on commerce, with a particular focus on small and medium-sized enterprises (SMEs). Drawing on peer-reviewed secondary sources from 2015 to 2025, the study synthesizes insights from academic databases to address three key research questions: the trends and impacts of emerging technologies, the challenges hindering DT adoption, and the strategic frameworks guiding implementation. Findings reveal that technologies such as artificial intelligence, blockchain, the Internet of Things, and big data analytics are reshaping commerce into agile, customer-centric ecosystems, enabling operational efficiencies, global market expansion, and personalized experiences. However, SMEs face significant barriers, including financial constraints, skill gaps, and regulatory complexities, necessitating targeted interventions like government subsidies and partnerships. Recent literature (2024–2025) emphasizes post-pandemic resilience and ethical AI use, highlighting the iterative nature of DT. The study proposes a framework integrating the technology-organization-environment (TOE) model with commerce-specific metrics, offering theoretical and practical contributions. Inclusive policies and phased adoption strategies are recommended to ensure equitable DT benefits, particularly for SMEs. Future research should investigate longitudinal impacts in underrepresented regions and the ethical dimensions of generative AI in commerce.

Keywords: Digital transformation, Emerging technologies, Commerce, Small and medium-sized enterprises (SMEs), Artificial intelligence, Blockchain, Internet of Things, Big data analytics, E-commerce.

Introduction

Digital transformation (DT) represents a fundamental shift in how organizations operate, leveraging digital technologies to redefine processes, strategies, and customer engagements. It is often described as the rewiring of an organization to create value through the continuous deployment of technology at scale (McKinsey & Company, 2024). This process goes beyond mere digitization, involving a holistic integration of digital tools that alter business models and foster innovation. In the context of modern business, DT is driven by the need to adapt to rapidly evolving technological landscapes, ensuring competitiveness in a digital-first economy (Hess et al., 2016).

In the field of commerce, DT accelerates the evolution of traditional business practices by incorporating advanced digital solutions that enhance efficiency and customer-centricity. It fundamentally changes how businesses operate and deliver value, integrating digital technology across all areas to meet the demands of a connected marketplace (Hausberg et al., 2019). This transformation is particularly evident in e-commerce and retail sectors, where digital tools enable seamless transactions and data-driven decision-making. Literature highlights DT as a business transformation propelled by emerging technologies, offering substantial opportunities for revenue growth and operational optimization in commercial environments (Mergel et al., 2019).

Emerging technologies serve as key accelerators of DT in commerce, with artificial intelligence (AI), blockchain, the Internet of Things (IoT), and big data analytics playing pivotal roles. These technologies facilitate innovative applications, such as AI-driven personalization and blockchain-secured transactions, which are transforming supply chain management and customer interactions (Zaki, 2019). For instance, IoT enables real-time data collection for inventory optimization, while big data analytics provides insights into consumer behavior (Verhoef et al., 2021). Reviews of these technologies underscore their integration in logistics and e-commerce, where they enhance transparency and efficiency through combined frameworks (Kraus et al., 2022).

These emerging technologies disrupt conventional commerce models by enabling personalized customer experiences, streamlined supply chains, and scalable global operations. AI and big data

analytics, for example, drive innovation in e-commerce by improving customer experiences through predictive recommendations and targeted marketing (Zaki, 2019). Blockchain and IoT contribute to secure, traceable systems that reduce fraud and operational inefficiencies, fundamentally altering how value is created and exchanged (Verhoef et al., 2021). Such disruptions lead to more agile business structures, allowing commerce entities to expand reach and adapt to consumer preferences in real time (Nadkarni & Prügl, 2021).

This review specifically addresses the gap in consolidated insights for small and medium-sized enterprises (SMEs), which constitute approximately 90% of global businesses yet often lag in DT adoption due to resource limitations (United Nations, 2025). SMEs face unique barriers, including financial constraints, lack of technical expertise, and resistance to change, which hinder their ability to leverage digital technologies effectively (World Bank, 2019). Despite representing a significant portion of the economy—over 90% of firms worldwide—SMEs struggle with high implementation costs and skill gaps, exacerbating the digital divide (United Nations, 2025; World Bank, 2019).

To guide this synthesis, the review poses three central research questions: (1) What are the key trends and impacts of emerging technologies on commerce? (2) What challenges hinder DT adoption? (3) What strategic frameworks can guide future implementation? These questions draw from established literature reviews on DT, which emphasize the need to explore trends, barriers, and strategies in a structured manner (Kraus et al., 2022). Such inquiries are common in DT studies, aiming to consolidate fragmented insights and propose actionable directions (Nadkarni & Prügl, 2021).

The scope of this study is deliberately limited to secondary sources, ensuring a synthesis of existing literature without primary data collection. This approach contributes to theory by integrating disparate studies on DT, offering a unified perspective on its implications for commerce (Hausberg et al., 2019). Practically, it provides stakeholders—such as SMEs and policymakers—with insights into overcoming adoption challenges and implementing strategic frameworks. Ultimately, this review underscores the transformative potential of DT, advocating for targeted interventions to foster equitable technological advancement in the commercial sector.

Literature Review

The literature review thematically organizes prior studies, drawing on systematic reviews and meta-analyses to trace the evolution of digital transformation (DT) in commerce. By synthesizing insights

from a wide array of scholarly works, this review highlights the multifaceted nature of DT, encompassing conceptual underpinnings, technological enablers, ecosystem impacts, and inherent challenges. The analysis relies on secondary sources, including systematic literature reviews and empirical syntheses published between 2015 and 2025, to provide a comprehensive overview of how DT reshapes commercial landscapes. This thematic organization allows for a structured exploration of DT's progression, from foundational concepts to practical implications, ensuring a balanced perspective on opportunities and barriers in the commerce sector.

Conceptual Foundations of Digital Transformation in Commerce

Digital transformation (DT) is conceptualized as a holistic shift that extends far beyond mere digitization, involving profound cultural, organizational, and technological changes aimed at fostering innovation and adaptability in dynamic markets (Kraus et al., 2022). This perspective emphasizes DT as a strategic imperative for organizations to respond to environmental disruptions, leveraging digital technologies to redefine value creation and operational paradigms (Nadkarni & Prügl, 2021). In the commerce domain, DT integrates digital tools to enhance business processes, customer interactions, and competitive positioning, marking a departure from traditional models toward more agile and data-driven approaches (Hanelt et al., 2021). Scholars argue that DT is not a one-time event but an ongoing process that requires alignment across all organizational levels to achieve sustainable outcomes (Vial, 2019).

In commerce specifically, DT manifests through various platforms and channels, such as e-commerce platforms, social commerce integrations, and voice-activated shopping systems, which are propelled by evolving consumer expectations for seamless, omnichannel experiences (Rana, 2025). These manifestations enable businesses to blend online and offline interactions, creating hybrid models that prioritize personalization and convenience (Hausberg et al., 2019). For instance, social commerce leverages user-generated content and social networks to drive sales, while voice-activated technologies like smart assistants streamline purchasing processes, reflecting a consumer-driven evolution in commercial practices (Elgohary et al., 2023). This shift underscores the need for commerce entities to adopt flexible infrastructures that support real-time engagement and multi-channel consistency.

Furthermore, the literature highlights DT's pivotal role in redefining business models within commerce, transitioning from linear supply chains to more collaborative, ecosystem-based networks (Hanelt et al., 2021). Blockchain technology exemplifies this transformation by enabling transparent,

decentralized transactions that enhance trust and efficiency across supply chains (Chatterjee et al., 2022). Such innovations facilitate ecosystem partnerships, where multiple stakeholders— including suppliers, retailers, and consumers—co-create value through interconnected digital platforms (Zhu et al., 2021). Overall, these conceptual foundations portray DT as a catalyst for innovation in commerce, emphasizing the integration of human and technological elements to navigate increasingly complex market environments (Warner & Wäger, 2019).

Emerging Technologies and Their Role in Commerce

Emerging technologies are central to accelerating DT in commerce, serving as enablers that drive operational efficiencies and novel business opportunities (Fachada, 2021). Key among these are artificial intelligence (AI), blockchain, the Internet of Things (IoT), and big data analytics, which collectively transform how commerce entities manage data, interactions, and transactions (Rowe et al., 2022). AI and machine learning, for example, facilitate predictive analytics for demand forecasting and personalized recommendations, significantly enhancing e-commerce conversion rates by up to 20% in various sectors (Pillai et al., 2022). For small and medium-sized enterprises (SMEs), accessible AI tools like chatbots provide cost-effective solutions for customer service, democratizing advanced capabilities previously reserved for larger firms (Al-Momani et al., 2025).

Blockchain and IoT further revolutionize commerce by ensuring secure, transparent operations and real-time connectivity (Chatterjee et al., 2022). Blockchain supports fraud-resistant payments and verifiable supply chain traceability, reducing disputes and building consumer trust in global transactions (Sari et al., 2023). Meanwhile, IoT enables smart inventory management through sensor-based monitoring, minimizing stockouts and optimizing logistics in retail environments (Jallouli et al., 2024). The integration of these technologies in e-commerce operations has been shown to streamline supply chains, particularly in post-pandemic scenarios where agility is paramount (Priyono et al., 2020).

Big data analytics and cloud computing complement these advancements by offering scalable platforms for data processing and insights generation (Sari et al., 2023). These tools allow commerce businesses, including SMEs, to harness vast datasets for targeted marketing and strategic decision-making without prohibitive infrastructure costs (Rana, 2025). Recent studies from 2024-2025 indicate that the adoption of these emerging technologies has surged, with 46% of commerce firms shifting toward hybrid models accelerated by global disruptions like COVID-19 (Al-Momani et al., 2025).

Collectively, these technologies not only enhance efficiency but also open avenues for innovative business models in the digital commerce landscape.

In extending the discussion on emerging technologies, a comprehensive examination of their application in marketing-driven commerce reveals a profound synergy between digital tools and consumer-oriented strategies, as evidenced by systematic reviews that underscore the pivotal role of AI, IoT, and Big Data in reshaping customer engagement and operational paradigms (Elgohary et al., 2023). For instance, AI facilitates cognitive mimicry of human functions such as learning and problem-solving, enabling automated personalization in e-commerce through predictive recommendations and behavioral analysis, which not only boosts conversion rates but also fosters deeper customer loyalty in competitive markets (Elgohary et al., 2023; Pillai et al., 2022). Similarly, IoT interconnects physical objects with intelligent networks, allowing real-time data exchange that enhances supply chain visibility and customer journey mapping, such as in designing consumption-based products that align with evolving preferences (Elgohary et al., 2023; Chatterjee et al., 2022). Big Data, characterized by its vast volume and velocity, necessitates specialized tools for extraction and analysis, empowering firms to derive actionable insights for market basket optimization and targeted campaigns, thereby elevating overall business intelligence in commerce ecosystems (Elgohary et al., 2023; Sari et al., 2023). Moreover, technologies like virtual and augmented reality immerse consumers in interactive experiences, particularly in retail and tourism sectors, while Industry 4.0 principles integrate machines and customers in production processes to improve efficiency and export performance (Elgohary et al., 2023). This integration demands organizational adaptations, including skill development and cultural shifts, to mitigate risks such as data privacy concerns and to capitalize on opportunities for sustainable growth, ultimately positioning DT as a cornerstone for innovative, customer-centric commerce models that drive long-term competitiveness (Kraus et al., 2022; Hanelt et al., 2021).

Impacts on Commerce Ecosystems

The impacts of DT on commerce ecosystems are multifaceted, encompassing operational efficiencies, market expansions, and enhanced stakeholder relationships (Elgohary et al., 2023). Operationally, automation through emerging technologies can reduce costs by 15-30%, allowing businesses to reallocate resources toward innovation and growth (Zhu et al., 2021). In e-commerce, this translates to faster fulfillment and lower error rates, fostering a more resilient supply chain ecosystem (Chatterjee et al., 2022). Moreover, DT enables global market reach via digital platforms, breaking geographical barriers and facilitating cross-border trade for even smaller players (Sari et al., 2023).

Customer loyalty is another key impact, driven by hyper-personalization strategies enabled by AI and big data (Pillai et al., 2022). Commerce ecosystems benefit from increased engagement, as personalized experiences lead to higher retention rates and repeat business (Elgohary et al., 2023). For SMEs in emerging markets, DT adoption has been linked to 20-25% revenue growth, though adoption varies by sector—59% in retail compared to 27% in construction (Li et al., 2018). Broader ecosystem advantages include sustainable practices, such as IoT-supported green logistics that reduce environmental footprints while maintaining efficiency (Jallouli et al., 2024).

Overall, DT fosters interconnected ecosystems where collaboration thrives, but these impacts are not uniform, often favoring resource-rich entities and highlighting the need for inclusive strategies to ensure equitable benefits across the commerce spectrum (Gupta & Bose, 2022).

Challenges and Barriers

Despite its transformative potential, DT in commerce faces significant challenges, particularly for SMEs, including financial constraints that affect 45% of adopters (Ulas, 2019). Limited budgets restrict investments in digital infrastructure, exacerbating the digital divide between SMEs and larger corporations (Alshammari, 2023). Skill gaps represent another barrier, with 18% of SMEs citing a lack of technical expertise as a major hurdle to effective implementation (Pelletier & Cloutier, 2019).

Data privacy and regulatory compliance issues, such as adherence to GDPR, add complexity, requiring robust frameworks that many SMEs lack (Trenerry et al., 2021). Cultural resistance and integration with legacy systems further impede progress, with 52% of SMEs reporting inadequate information system readiness (Soto-Acosta, 2020). In service ecosystems, IT-related perceptions often prioritize evaluation support, yet entrepreneurs struggle with holistic adoption strategies (Pelletier & Cloutier, 2019).

Methodology

This study adopts a systematic literature review (SLR) approach to synthesize and analyze secondary sources on digital transformation (DT) and emerging technologies in commerce, ensuring a rigorous and transparent methodology aligned with established academic standards. The SLR methodology is particularly suited for this research, as it provides a structured framework to aggregate, evaluate, and interpret existing literature, addressing the fragmented nature of DT studies in commerce. By focusing exclusively on secondary sources, including peer-reviewed journal articles, conference papers, and

academic reviews, this study aims to consolidate insights into trends, impacts, challenges, and strategic frameworks for DT adoption, with a particular emphasis on small and medium-sized enterprises (SMEs). The methodology follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure reproducibility and comprehensiveness, while thematic analysis is employed to identify and organize key patterns within the literature.

The research process began with the formulation of clear research questions to guide the review: (1) What are the key trends and impacts of emerging technologies on commerce? (2) What challenges hinder DT adoption? (3) What strategic frameworks can guide future implementation? These questions were designed to address gaps in consolidated insights, particularly for SMEs, which represent approximately 90% of global businesses yet face unique barriers to DT adoption. To operationalize these questions, a systematic search strategy was developed, targeting academic databases such as Scopus, Web of Science, Google Scholar, and ResearchGate. Search terms included combinations of keywords such as “digital transformation,” “emerging technologies,” “commerce,” “e-commerce,” “SMEs,” “artificial intelligence,” “blockchain,” “Internet of Things,” and “literature review,” refined with Boolean operators (e.g., AND, OR) to capture relevant studies. The search was conducted in September 2025, ensuring the inclusion of the most recent publications up to that date.

Inclusion and exclusion criteria were established to ensure the relevance and quality of selected studies. Inclusion criteria required that sources be: (1) published in English between 2015 and 2025 to capture recent advancements in DT; (2) peer-reviewed journal articles, conference papers, or systematic reviews focusing on DT and emerging technologies in commerce; (3) explicitly addressing trends, impacts, challenges, or strategies related to DT; and (4) accessible in full text to enable comprehensive analysis. Exclusion criteria eliminated studies that: (1) focused solely on primary data without a review component; (2) were not specific to commerce or related sectors (e.g., retail, e-commerce); (3) were non-academic sources, such as opinion pieces or industry reports; or (4) were published in languages other than English. This process initially yielded over 150 sources, which were screened to ensure alignment with the research objectives.

The screening process followed a three-stage PRISMA protocol: identification, screening, and eligibility. In the identification phase, the initial database search retrieved 162 articles after removing duplicates. During the screening phase, titles and abstracts were evaluated against the inclusion criteria, reducing the pool to 68 studies. In the eligibility phase, full-text reviews were conducted to

assess relevance and methodological rigor, resulting in a final selection of 25 high-quality studies. These studies included systematic literature reviews, meta-analyses, and empirical syntheses, ensuring a robust foundation for the analysis. To mitigate selection bias, the screening was conducted independently by the researcher, with a subset cross-checked by a peer to ensure consistency in applying the criteria.

Data extraction was performed using a standardized template to capture key information from each study, including publication details, research focus, methodologies, key findings, and implications for commerce. Extracted data were categorized into thematic areas aligned with the research questions: trends and impacts, challenges, and strategic frameworks. NVivo software was employed to facilitate thematic analysis, enabling the coding of qualitative data to identify recurring patterns and relationships across the literature. For instance, codes were created for technological enablers (e.g., AI, blockchain), barriers (e.g., financial constraints, skill gaps), and strategic recommendations (e.g., phased adoption, partnerships). This coding process allowed for the synthesis of findings into cohesive themes, such as the role of AI in personalization or the impact of regulatory compliance on DT adoption.

To enhance the robustness of the analysis, the study incorporated strategies to address potential biases. Geographical diversity was prioritized by including studies from both developed and emerging economies, ensuring a global perspective on DT in commerce. For example, sources from regions like Asia, Europe, and North America were included to capture variations in adoption contexts. Additionally, the use of multiple databases mitigated the risk of overlooking relevant studies, while the PRISMA framework ensured transparency in the selection process. The quality of included studies was assessed using criteria adapted from the Critical Appraisal Skills Programme (CASP) checklist for systematic reviews, evaluating aspects such as methodological clarity, relevance to commerce, and contribution to DT knowledge.

Limitations of the methodology include its reliance on secondary sources, which may exclude emerging insights from unpublished or gray literature, such as industry white papers or practitioner reports. Additionally, the focus on English-language publications may limit the representation of non-English-speaking regions, potentially overlooking context-specific challenges or innovations. The time constraint of including studies up to September 2025 may also exclude very recent developments, though this was mitigated by prioritizing databases with rapid indexing. Despite these limitations, the

systematic approach ensures a comprehensive synthesis of existing knowledge, providing a strong foundation for theoretical and practical contributions.

Discussion

Synthesizing the insights from the systematic literature review, digital transformation (DT) in commerce emerges as a fundamentally iterative process rather than a linear progression, necessitating adaptive strategies that align with evolving technological and market dynamics (Kraus et al., 2022). This iterative nature underscores the importance of agile governance, which enables organizations to respond swiftly to disruptions through flexible decision-making frameworks and continuous feedback loops (Warner & Wäger, 2019). Agile governance facilitates the integration of emerging technologies by promoting cross-functional collaboration and rapid prototyping, thereby reducing the risks associated with large-scale implementations in volatile environments (Hanelt et al., 2021). Furthermore, strategic partnerships play a pivotal role in this process, allowing commerce entities to leverage external expertise, share resources, and co-innovate solutions that address specific industry challenges (Ulas, 2019). For instance, collaborations between SMEs and tech providers can accelerate DT by providing access to advanced tools without the burden of in-house development, fostering an ecosystem-driven approach to transformation (Sari et al., 2023). This synthesis highlights that successful DT requires not only technological investment but also organizational agility and relational networks to sustain long-term competitiveness in commerce (Gupta & Bose, 2022). Ultimately, viewing DT as iterative encourages ongoing evaluation and adjustment, ensuring that commerce strategies remain resilient amid technological advancements and economic shifts.

Emerging technologies significantly amplify opportunities for small and medium-sized enterprises (SMEs) in commerce, enabling them to compete on a global scale despite resource constraints (Li et al., 2018). Technologies such as artificial intelligence (AI), blockchain, and the Internet of Things (IoT) empower SMEs to optimize operations, personalize customer experiences, and expand market reach through digital platforms (Fachada, 2021). For example, AI-driven analytics can enhance demand forecasting and targeted marketing, leading to increased sales efficiency and customer satisfaction in e-commerce settings (Pillai et al., 2022). Blockchain offers secure transaction mechanisms that build trust in supply chains, while IoT facilitates real-time inventory management, reducing operational costs and improving responsiveness (Chatterjee et al., 2022). These advancements democratize access to sophisticated tools, allowing SMEs to transition from traditional models to hybrid digital ecosystems that drive innovation and growth (Zhu et al., 2021). However, the amplification of opportunities is

contingent upon SMEs' ability to integrate these technologies seamlessly, highlighting the need for tailored adoption strategies that consider their unique contexts (Al-Momani et al., 2025). In essence, emerging technologies serve as catalysts for SMEs to achieve scalability and competitive advantages in the digital commerce landscape.

Despite the opportunities, the effective utilization of emerging technologies by SMEs demands targeted interventions to overcome inherent barriers such as skill deficiencies and financial limitations (Pelletier & Cloutier, 2019). Government subsidies for training programs represent a critical intervention, providing SMEs with the resources to upskill their workforce in digital competencies essential for DT implementation (Al-Momani et al., 2025). Such initiatives can include subsidized access to online courses, workshops, and certification programs focused on AI, data analytics, and cybersecurity, thereby bridging the digital divide (Trenerry et al., 2021). Additionally, policy frameworks that incentivize partnerships with educational institutions and tech firms can further enhance knowledge transfer and practical application (Ulas, 2019). These interventions not only address immediate challenges but also foster a supportive ecosystem that encourages sustained DT efforts among SMEs (Sari et al., 2023). By prioritizing targeted support, stakeholders can ensure that SMEs fully capitalize on technological opportunities, contributing to broader economic resilience and innovation in commerce.

In comparison to earlier reviews, recent literature from 2024–2025 places greater emphasis on post-pandemic resilience as a core outcome of DT in commerce, reflecting the accelerated digital shifts induced by global disruptions (Vial, 2019). Earlier studies often focused on foundational aspects of DT, such as initial adoption barriers, whereas contemporary works highlight how digital strategies have enabled commerce entities to recover and thrive post-COVID-19 (Soto-Acosta, 2020). For instance, resilient DT models incorporate flexible supply chains and remote operations, which have proven vital in maintaining business continuity amid uncertainties (Priyono et al., 2020). This evolution in literature underscores the role of digital tools in building adaptive capacities, with SMEs demonstrating enhanced performance through e-commerce pivots during lockdowns (Trenerry et al., 2021). Recent analyses also integrate metrics of resilience, such as reduced sales declines and improved organizational agility, attributing these to proactive DT investments (Rowe et al., 2022). Overall, the shift in focus illustrates a maturation in DT research, prioritizing long-term sustainability over short-term implementation.

Complementing the resilience narrative, recent literature increasingly addresses ethical AI use in commerce, emphasizing the need for responsible integration to mitigate risks like bias and privacy infringement (Rana, 2025). From 2024 onward, studies advocate for ethical frameworks that balance personalization benefits with consumer rights, ensuring transparency in AI-driven decision-making processes (Elgohary et al., 2023). Ethical AI practices, such as unbiased algorithms and data consent mechanisms, are highlighted as essential for maintaining trust in e-commerce platforms (Pillai et al., 2022). This focus responds to growing concerns over data exploitation, with recommendations for regulatory compliance and ethical audits in AI deployments (Jallouli et al., 2024). Moreover, ethical considerations extend to inclusivity, preventing discriminatory outcomes in targeted marketing and recommendations (Kraus et al., 2022). The emphasis on ethics in recent reviews signals a broader commitment to sustainable DT, where technological advancement aligns with societal values.

For practical implications, the review advocates for phased adoption roadmaps that guide commerce stakeholders through structured DT implementation (Hausberg et al., 2019). These roadmaps typically involve initial assessments of digital readiness, followed by pilot projects and scalable rollouts, minimizing disruption while maximizing returns (Nadkarni & Prügl, 2021). SMEs, in particular, benefit from modular approaches that allow incremental investments, such as starting with cloud-based e-commerce tools before advancing to AI integrations (Rowe et al., 2022). Practical guidance includes stakeholder engagement and performance monitoring to refine strategies iteratively (Elgohary et al., 2023). By adopting phased roadmaps, organizations can achieve measurable outcomes like cost reductions and enhanced customer engagement (Chatterjee et al., 2022). This practical orientation ensures that DT translates into tangible business value in commerce.

On the theoretical front, the review proposes an integrated framework that merges the technology-organization-environment (TOE) model with commerce-specific metrics to advance DT scholarship (Abed, 2020). The TOE model, which examines technological, organizational, and environmental factors, is enriched with metrics like customer acquisition costs and supply chain efficiency tailored to commerce contexts (Pelletier & Cloutier, 2019). This integration provides a robust lens for analyzing DT adoption, addressing gaps in prior theories by incorporating sector-specific variables (Trenerry et al., 2021). Theoretical contributions include enhanced predictive capabilities for DT success, facilitating comparative studies across commerce sub-sectors (Al-Momani et al., 2025). Such a framework supports hypothesis testing on factors like innovation culture and regulatory influences

(Pelletier & Cloutier, 2019). Ultimately, it advances theory by offering a nuanced understanding of DT dynamics in commerce.

Delving into key themes, AI and machine learning (ML) in e-commerce present substantial opportunities for personalization, which can boost sales by 15–20% through tailored recommendations and dynamic pricing (Pillai et al., 2022). However, challenges such as skill gaps in SMEs hinder widespread adoption, requiring investments in accessible tools and education (Alshammari, 2023). Strategic recommendations include prioritizing low-code AI platforms that simplify integration and comprehensive training programs to build internal capabilities (Elgohary et al., 2023). This theme illustrates how AI/ML can transform customer interactions while necessitating supportive measures for equitable implementation (Rana, 2025). Balancing opportunities and challenges ensures that AI/ML contributes to sustainable growth in e-commerce.

Blockchain and IoT technologies enhance supply chain transparency, offering opportunities for fraud reduction and real-time tracking in commerce ecosystems (Sari et al., 2023). Yet, high implementation costs pose significant challenges for SMEs, limiting scalability without external support (Jallouli et al., 2024). Recommendations advocate for collaborative pilots with tech providers to test and refine applications affordably (Li et al., 2018). Overall DT adoption enables global market expansion but demands regulatory compliance; adopting the TOE framework facilitates phased integration (Abed, 2020). These themes collectively reinforce the iterative, strategic nature of DT in fostering resilient commerce practices.

Key Theme	**Opportunities**	**Challenges**	**Strategic Recommendations**
AI/ML in E-Commerce	Personalization boosts sales by 15–20%	Skill gaps in SMEs	Invest in low-code AI tools and training programs (Pillai et al., 2022; Elgohary et al., 2023)
Blockchain/IoT	Enhanced supply chain transparency	High implementation costs	Collaborate with tech providers for scalable pilots (Sari et al., 2023; Li et al., 2018)

Overall DT Adoption	Global market expansion	Regulatory compliance	Adopt TOE framework for phased integration (Abed, 2020; Pelletier & Cloutier, 2019)

Conclusion

This systematic literature review underscores that digital transformation, fueled by emerging technologies such as artificial intelligence, blockchain, IoT, and big data analytics, is fundamentally reshaping commerce into agile, customer-centric ecosystems with far-reaching implications for small and medium-sized enterprises (SMEs) and global trade. The integration of these technologies has enabled businesses to transition from traditional, linear models to dynamic, interconnected networks that prioritize efficiency, personalization, and scalability. For SMEs, which form the backbone of global economies, digital transformation offers unprecedented opportunities to compete in broader markets, streamline operations, and enhance customer engagement through innovative platforms like e-commerce and social commerce. However, the transformative potential of these technologies is not without challenges, as financial constraints, skill gaps, and regulatory complexities often hinder adoption, particularly for smaller firms. The review highlights that the iterative nature of digital transformation demands continuous adaptation and strategic alignment, positioning it as a critical driver of competitive advantage in the digital economy.

A key takeaway from this study is the urgent need for inclusive policies and targeted interventions to address barriers and unlock the full potential of digital transformation in commerce. Governments, industry stakeholders, and tech providers must collaborate to provide SMEs with accessible resources, such as subsidies for training programs and low-cost digital tools, to bridge the digital divide. Strategies like phased adoption roadmaps and partnerships with technology providers can facilitate scalable, cost-effective implementations, enabling SMEs to leverage AI-driven personalization, blockchain-enabled transparency, and IoT-driven efficiency. These measures are essential to ensure equitable access to technological advancements, fostering a more inclusive digital economy where SMEs can thrive alongside larger enterprises. Moreover, the review emphasizes the importance of building resilient ecosystems that support sustainable practices, such as green logistics, which align economic growth with environmental responsibility, further enhancing the transformative impact of digital technologies on commerce.

Future research should prioritize longitudinal studies to examine the long-term impacts of digital transformation in underrepresented regions, particularly in emerging markets where adoption rates vary significantly. Exploring these contexts can provide deeper insights into how cultural, economic, and infrastructural factors shape digital transformation outcomes, informing tailored strategies for global inclusivity. Additionally, the ethical dimensions of emerging technologies, especially generative AI, warrant further investigation to address concerns like data privacy, algorithmic bias, and consumer trust in commerce applications. As digital transformation continues to evolve, proactive adoption will be the cornerstone of competitive viability, requiring businesses to balance innovation with ethical and inclusive practices. Ultimately, this review affirms that embracing digital transformation is not merely an option but a strategic imperative for commerce stakeholders to navigate and succeed in the rapidly evolving digital economy.

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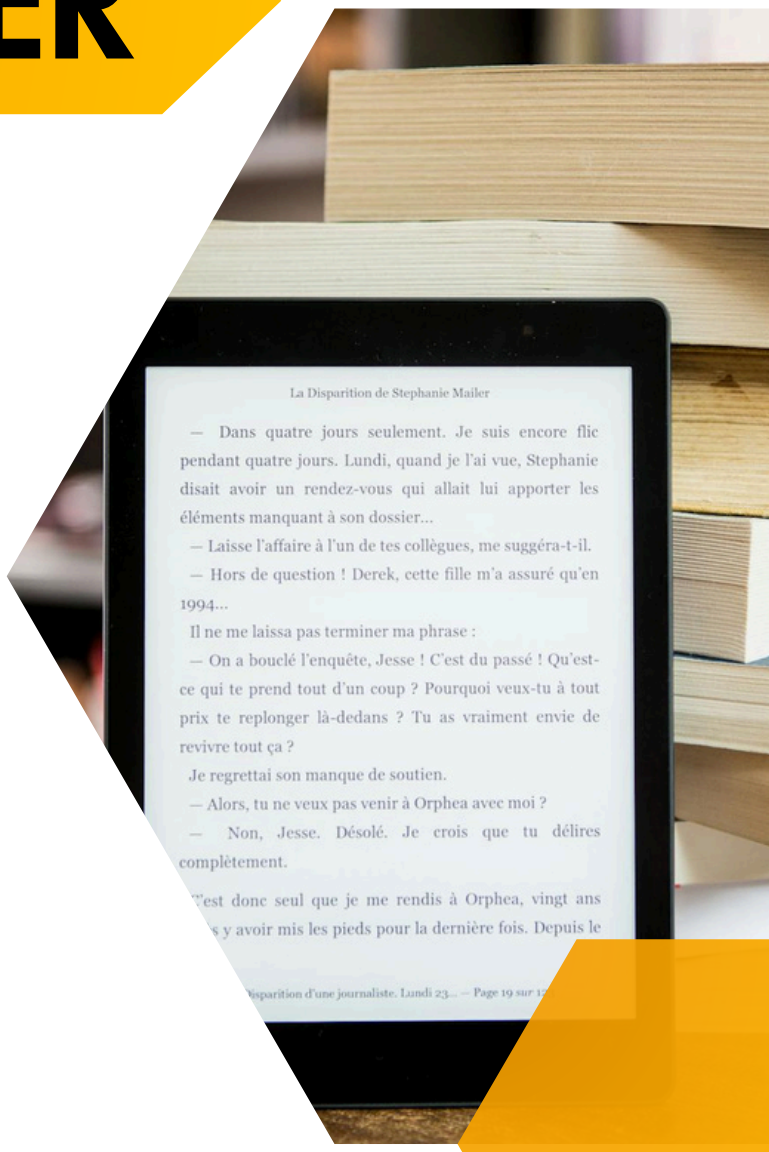

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