

Digital Transformation of SMEs: The Role of Information Systems in Enhancing Efficiency and Competitiveness

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Abstract. *In the contemporary global economy, digital transformation (DT) has transitioned from a strategic option to an essential survival mechanism for small and medium-sized enterprises (SMEs). This study examines the multifaceted role of information systems (IS) in enhancing organizational efficiency and promoting a sustainable competitive advantage. By integrating diverse perspectives from recent literature, the research examines how digital tools, including cloud computing, blockchain, and business intelligence, are reshaping SME operations. At the same time, the transformation process introduces critical challenges, particularly in the areas of cybersecurity, resource constraints, and workforce readiness. The effectiveness of digital adoption depends not only on technological implementation but also on the development of employees' digital capabilities and adaptive organizational structures. Companies that successfully align digital strategies with human competencies and leadership practices are better positioned to foster innovation and sustain competitive advantage. The shift toward digitally enabled business models supports greater flexibility, efficiency, and access to global markets. Ensuring data security and maintaining trust remain critical for long-term success. A balanced approach that combines technological advancement, strategic management, and robust security frameworks is essential for achieving sustainable growth and resilience in a rapidly evolving business environment.*

Keywords: digital transformation, SMEs, information systems, organizational efficiency, cybersecurity

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KOM-ların rəqəmsal transformasiyası: informasiya sistemlərinin səmərəliliyin və rəqabətqabiliyyətliliyin artırılmasındakı rolu

Rəşidə Xeyrullayeva 

Xülasə. *Müasir global iqtisadiyyatda rəqəmsal transformasiya (RT) kiçik və orta bizneslər (KOB) üçün artıq strateji seçim yox, zəruri mexanizmə çevrilmişdir. Bu tədqiqat informasiya sistemlərinin (İS) təşkilati səmərəliliyin artırılması və davamlı rəqabət üstünlüyünün təmin edilməsində rolunu araşdırır.*

Araşdırma bulud hesablamaları, blokçeyn və biznes analitikası kimi rəqəmsal alətlərin KOB-ların fəaliyyətini necə yenidən formalaşdırdığını təhlil edir. Rəqəmsal transformasiya prosesi xüsusilə kiber təhlükəsizlik, məhdud resurslar və kadrların rəqəmsal bacarıqlarının yetərsizliyi kimi sahələrdə ciddi problemlərlə üzləşir. Rəqəmsal texnologiyaların tətbiqinin effektivliyi yalnız texnoloji həllərin implementasiyasından deyil, həm də işçi heyətinin rəqəmsal kompetensiyalarının və təşkilati strukturların adaptasiya qabiliyyətinin inkişaf səviyyəsindən asılıdır. Rəqəmsal biznes modellərinə keçid müəssisələrə daha yüksək çeviklik, əməliyyat səmərəliliyi və qlobal bazarlara çıxış imkanı yaradır. Bununla belə, məlumat təhlükəsizliyinin təmin edilməsi və rəqəmsal etimadın qorunması uzunmüddətli uğur üçün həlledici amil olaraq qalır. Texnoloji innovasiyaları, strateji idarəetməni və güclü kibertəhlükəsizlik yanaşmalarını integrasiya edən biznes modeli sürətlə dəyişən biznes mühitində davamlı inkişaf və rəqabət qabiliyyətinin qorunması üçün mühüm əhəmiyyət daşıyır.

Açar sözlər: *rəqəmsal transformasiya, KOB, informasiya sistemləri, təşkilati səmərəlilik, kiber təhlükəsizlik*

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Introduction

Small and medium-sized enterprises (SMEs) operate in an increasingly dynamic and technology-driven business environment, where adaptability and innovation determine long-term success. In recent years, the rapid expansion of digital technologies has fundamentally altered how organizations create value, interact with customers, and manage internal processes. As a result, digital transformation has become a central component of business strategy, enabling firms to enhance efficiency, improve decision-making, and remain competitive in both local and global markets. For SMEs in particular, the adoption of digital solutions presents both significant opportunities and notable challenges, as limited resources often constrain their ability to implement complex technological systems. Today, as the Data Economy is actively forming, the further development of SMEs depends critically on their ability to guarantee the authenticity, protection, and preservation of information. This process involves a series of organization-wide changes in management and information technologies (IT) in response to new developments in the external environment. Unlike simple digitization (moving from analog to digital), true digital transformation entails a deeper, core change of the entire business model of an organization with ripple effects across entire industries (Mikalef & Parmiggiani, 2022). Information systems (IS) act as the fundamental pillars of this evolution, facilitating streamlined administrative and productive processes that simplify work procedures and improve organizational performance.

However, the journey toward a digitally transformed state is fraught with complexity and necessitates a shift in trust from centralized institutions to mathematical algorithms and cryptography. As firms integrate new technologies like cloud computing, blockchain, and digital twins, they must simultaneously navigate strategic security challenges. Information security has thus become a primary strategic priority, as the reliance on IS makes organizations more vulnerable to cyber-attacks and unauthorized data manipulation. Ensuring the confidentiality and integrity of transmitted data through protocols like SSL/TLS, VPNs, and HTTPS is now a cornerstone of sustainable cybersecurity.

The goal of digital transformation for SMEs is to cultivate organizational agility, enabling them to sense and respond to market opportunities and threats with speed (Gebremeskel et al., 2023). This involves shifting from traditional linear business models to circular or service-centric propositions that enhance long-term competitiveness (Ranta et al., 2021). This research explores the multifaceted role of information systems in driving these efficiencies, drawing on recent literature to analyze how digital adoption, coupled with human digital capabilities, leads to meaningful innovation performance. By aligning digital strategies with adaptive management structures and robust security frameworks, SMEs can ensure their resilience and market relevance in a rapidly evolving, data-driven business environment.

Research

Information systems enhance the administrative and productive processes of corporations by simplifying work procedures and improving performance. By utilizing capabilities like Business Intelligence (BI), SMEs can match their internal resources to specific problem spaces, ensuring that decision-making is both efficient and evidence-based (İşık et al., 2013). The integration of digital accounting information systems, for instance, streamlines laborious processes, freeing up resources for higher-value activities (Huy & Phuc, 2024). Digital transformation success in the SME context is a multifaceted process that requires a holistic understanding of various determinants across different organizational layers (Sagala & Ori, 2024):

1. Cloud Computing and Infrastructure: Adopting cloud solutions provides SMEs with resource efficiency and cost-effective access to scalable infrastructure;
2. Digital Twins and Supply Chain: The conceptualization of a digital supply chain twin allows firms to manage disruption risks and ensure business continuity through real-time data analysis. The importance of this transformation cannot be overstated, as SMEs account for approximately 90% of businesses and more than 50% of employment worldwide, acting as the primary engines of economic growth. In this landscape, the integration of digital technologies allows firms to optimize operations and reach global markets through online platforms, overcoming geographical limitations that previously hindered growth. Organizations that successfully embrace these changes often report significant increases in productivity – sometimes as high as 20% compared to traditional counterparts (Schafer et al., 2023). Furthermore, pervasive digital technologies provide a new "digital materiality," introducing reprogrammable functionality and data homogenization that allow designers to expand physical products with software-based capabilities.

Competitiveness in SMEs is driven by their ability to produce high-quality goods at the right time and price, more efficiently than their rivals (Tashtoush, 2021). Digital transformation catalyzes business model innovation, allowing firms to shift from traditional linear models to circular or service-centric propositions. Pervasive digital technologies provide "reprogrammable functionality" and "data homogenization," which are key traits for creating convergent and generative innovations. These fundamental properties provide an environment of open affordances where digital materiality enables the creation of novel experiences and new organizational forms (Yoo et al., 2012).

Table 1
Comparative overview of key IS tools: efficiency and competitiveness impact on SMEs

IS Category	Core Function	SME Efficiency Gain	Competitive Impact
ERP Systems	Integrates finance, HR, supply chain	Process automation; 20–25% reduction in admin time	Operational cost leadership
CRM Platforms	Customer data, sales pipeline management	Shorter sales cycles, lower churn	Enhanced customer loyalty
Cloud Computing	Scalable IT infrastructure on demand	Reduced CAPEX; flexible scaling	Access to enterprise-grade tools
Business Intelligence (BI)	Data analytics and reporting	Faster evidence-based decisions	Market responsiveness
Digital Accounting IS	Financial reporting and control	Accuracy, compliance, transparency	Sustainable innovation ecosystem

Source: Compiled by the author based on research

Table 1 presents a comparative overview of five information systems tools and their respective impacts on SME efficiency and competitiveness. These IS tools demonstrate that digital transformation is not a singular technological event but a layered, interconnected process through which SMEs can systematically enhance both operational efficiency and long-term competitive positioning. Successful SMEs focus on building "digital capabilities" within their workforce, as digital tools alone do not guarantee innovation without the human skills to utilize them effectively (Abdulaal, 2026). This evolution effectively treats digital transformation as a continuous innovation process, where higher digital capabilities allow firms to harness technology more effectively to yield significant benefits in terms of organizational competitiveness (Romero & Mammadov, 2024).

Digital transformation is fundamentally reshaping organization design. It impacts how tasks are determined, assigned, and recombined within a firm, facilitating a more efficient match between employees and roles (Kretschmer & Khashabi, 2020). Digital transformational leadership plays a moderating role in this process, amplifying the positive effects of employee competencies on innovation performance.

As SMEs move into the digital marketplace, they become increasingly vulnerable to cyber-attacks. Ensuring information security through mechanisms like SSL/TLS, VPNs, and blockchain is essential for protecting transactions and sensitive data. SMEs often face greater risks due to limited resources for mitigation (Gebremeskel et al., 2023). Even at a macro level, socio-economic factors and physical security risks, such as the misuse of emerging technologies like drones, can impact the broader investment climate for digital transformation.

Conclusion

The digital transformation of SMEs is a complex, non-linear process that relies heavily on the effective deployment of information systems. The research suggests that when digital tools are

integrated into a firm's strategy, they significantly enhance both operational efficiency and market competitiveness. However, for these benefits to be realized, SMEs must navigate significant information security challenges and financial constraints.

One of the most critical takeaways is that DT is as much about people and leadership as it is about technology. Leaders must foster a digital culture and invest in employee capabilities to translate digital adoption into innovation performance. Furthermore, organizations must adapt their design to be more contingent on the tasks at hand, leveraging the increased information flow provided by modern IS. In conclusion, while the risks of the digital world are many-from cybercrime to macroeconomic instability-the potential for growth through systematic transformation remains the primary path forward for SMEs in the 21st century.

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