ECONOMICS

UDC 339.92:005.936.3]:004.9

DOI 10.26661/2522-1566/2024-3/29-03

CHALLENGES OF IMPLEMENTING DIGITAL TECHNOLOGIES IN INTERNATIONAL ENTERPRISES

Kuan Zhang*

Sumy state university
Sumy, Ukraine
ORCID 0000-0002-3992-0838

*Corresponding author email: Zhang.Kuan@aspd.sumdu.edu.ua

Abstract. This study examines the major challenges multinational companies face when implementing digital technologies in various markets and proposes strategies to mitigate these obstacles. As digital technologies like IoT, AI, and blockchain become increasingly vital for maintaining competitiveness and operational efficiency, multinational enterprises (MNEs) must integrate them into their global operations. However, this process is fraught with challenges, particularly in areas such as technological infrastructure, regulatory compliance, talent shortages, and cultural differences. A key obstacle is the varying levels of technological infrastructure across regions, with some markets lacking the necessary resources for seamless digital adoption. Regulatory compliance further complicates the process, as companies must navigate differing data protection laws, industry standards, and requirements for cross-border data flows. Additionally, talent shortages, particularly in emerging markets, hinder the implementation of these advanced technologies due to a lack of skilled personnel. Cultural differences also influence how employees interact with and adopt new digital systems, potentially slowing down the integration process. To overcome these challenges, MNEs need to adopt localized strategies, such as developing lightweight software tailored to regional infrastructure, enhancing training programs to build local expertise, and ensuring adherence to regional data regulations. By implementing these solutions, multinational companies can effectively manage the complexities of global digital technology adoption and maintain their competitiveness.

INTRODUCTION

The growing reliance on digital technologies like cloud computing, Big Data analytics, and the Internet of Things (IoT) has transformed how international enterprises operate and compete globally. However, implementing these technologies across diverse markets presents a unique set of challenges. Differences in technological infrastructure, such as varying internet speeds, bandwidth limitations, and unreliable power supplies, can significantly impede the effectiveness of digital tools. For example, countries with slower or unstable internet connections struggle to support cloud-based applications, leading to performance bottlenecks. Regulatory compliance adds another layer

of complexity, as different countries impose varying requirements on data privacy, storage, and transmission, particularly in regions like the European Union under GDPR. Companies must adapt their digital frameworks to meet these local standards, which often increases implementation costs and timelines. Furthermore, the shortage of skilled IT professionals in many developing markets hampers the ability to troubleshoot and maintain digital systems effectively, resulting in delayed issue resolution and reduced operational efficiency. These challenges require companies to adopt flexible, region-specific strategies to successfully integrate digital technologies on a global scale. This study examines the key obstacles faced by multinational corporations in implementing digital solutions and explores strategies for overcoming them, using the latest available data from 2023 to provide insights and recommendations for successful international technology deployment.

LITERATURE REVIEW

Globalization has led to an increasing reliance on digital technologies by international businesses to enhance competitiveness and operational efficiency. However, several challenges impede their global implementation. Studies highlight key issues such as limited network bandwidth, IT professional shortages, and the difficulty of integrating legacy systems with new digital technologies (Smith, 2021; Clarke, 2020; Zhang et al., 2019).

In addition, unstable power supplies and varying local data storage regulations present significant barriers, complicating the compliance efforts of multinational companies (Fernandes, 2022; Jones & Williams, 2018). These challenges vary significantly across regions, requiring companies to adopt flexible and customized approaches.

Recent research suggests solutions such as developing lightweight software tailored for regions with limited technological resources, collaborating with local partners to enhance infrastructure, and improving local IT skills through training (Chen et al., 2023; Kapoor, 2021). These strategies allow businesses to mitigate the challenges and improve their digital technology implementation globally.

PAPER OBJECTIVE

The main purpose of this study is to explore the challenges faced by international companies when implementing digital technologies in different countries and regions and to propose strategies to address these challenges.

METHODOLOGY

This article uses literature analysis and data analysis methods. It focuses on the challenges faced by multinational companies when implementing digital technologies in different countries and regions, and further explores the companies' response strategies in terms of technological infrastructure, data compliance and talent shortage.

Technical infrastructure challenges: When multinational companies implement digital technologies in the global market, the first thing they face is the differences in technological infrastructure between countries. According to the latest data from 2023, network bandwidth and Internet connection limitations are one of the most prominent challenges. As we can see from Table 1.

Table 1.

Comparison of Internet bandwidth and connection quality by country (2023)

Country	Average download speed （Mbps）	Average upload speed （Mbps）	Average latenc （ms）
United States	150	20	25
Germany	120	18	28
Japan	140	16	22
India	60	10	50
South Africa	40	8	70

Source: Collected by author based on Speedtest Global Index

Table 1 illustrates the stark differences in internet bandwidth and connection quality across various countries in 2023. Developed nations like the US, Germany, and Japan exhibit significantly higher network speeds and lower latency, facilitating the seamless implementation of digital technologies such as cloud computing and real-time data analytics. Conversely, countries like India and South Africa face slower internet speeds and higher latency, which presents challenges for businesses aiming to adopt these advanced digital tools. For successful digital technology deployment in regions with poor network conditions, companies may need to develop lightweight software applications that are less reliant on high-speed connections. Additionally, collaboration with local internet service providers (ISPs) to improve network performance can also be crucial. These strategies help bridge the digital divide, ensuring that enterprises can successfully implement technology in diverse global markets.

Usability Challenges for IT Professionals: In addition, the quality and availability of local IT support vary. In some countries, the shortage of professional IT personnel has seriously affected the maintenance and troubleshooting of digital technologies. This problem is particularly prominent in many developing countries, resulting in longer resolution time for technical problems, which in turn affects the operational efficiency of enterprises. As we can see from Table 2.

Table 2.

Comparison of availability of IT professionals in various regions around the world (2023)

Country	Number of senior IT professionals employed (per million people)	Number of mid-level IT professionals employed (per million people)	Number of basic IT professionals employed (per million people)
North America	450	1100	2400
Europe	420	950	2100
Asia	250	850	1800
Latin America	150	500	1200
Africa	100	300	800

Source: Collected by authors based on Gartner, Eurostat, IDC, Latin America lT Report and African Union lT Report

Table 2 reveals significant disparities in the availability of IT professionals across global regions in 2023. North America and Europe boast a higher concentration of senior and mid-level IT professionals, which supports efficient implementation of digital technologies, along with robust technical support and innovation. On the other hand, Africa and Latin America suffer from a shortage of IT talent, particularly in specialized or senior positions. This talent gap creates obstacles for multinational companies attempting to implement digital technologies in these areas, as a lack of skilled professionals can hinder technical support, system maintenance, and upgrades. To mitigate these challenges, companies may need to invest in local training programs, establish partnerships with educational institutions, or outsource talent to bridge the gap and ensure smoother technology integration.

Regulatory and compliance challenges: When multinational companies implement digital technologies, differences in laws and regulations in different countries and regions are also an important obstacle. Especially in terms of data security, storage and transmission, regulations vary from country to country. Data for 2023 show significant differences in the complexity and stringency of regulations across countries. As we can see from Table 3.

Table 3.

Assessment of the complexity of data privacy and security regulations in various countries
(2023)

Country	Data privacy regulation score (1-10)	Data storage requirements score (1-10)	Data transfer security score (1-10)
United States	8	7	9
European Union	9	8	10
Japan	7	6	8
China	6	7	7
India	6	5	7

Source: Collected by authors based on McKinsey Data Privacy Report, GDPR Compliance Report, Japan Data Privacy Overview, China Cybersecurity Law Review and India Data Protection Act Review

Table 3 compares the complexity of data privacy and security regulations across different countries, revealing significant differences. The European Union (EU) stands out with the most stringent regulations, particularly regarding data privacy, storage, and transmission security, earning the highest score. On the other hand, China and India have comparatively lower scores, indicating more lenient data privacy and security regulations. These regulatory disparities pose considerable challenges for multinational companies aiming to implement digital technologies in diverse markets. To ensure compliance and avoid legal risks or fines, companies must tailor their data processing, storage, and transmission strategies according to local regulations. In stricter regions like the EU, businesses need to adopt more rigorous standards, while in countries with looser regulations, they may have more flexibility in their approaches.

Power supply stability challenges: In addition, the stability of power supply also has an important impact on the implementation of digital technologies, especially in developing countries. Data for 2023 show significant differences in the stability of electricity supply in different countries. As we can see from Table 4.

Table 4.

Electricity supply stability and its impact on digital technology implementation by country (2023)

Country	Average power outage duration (hours/year)	Power outage frequency (times/year)	Number of digital technology projects affected (%)
United States	3	1	5
Germany	2	1	3
India	12	7	25
South Africa	20	10	35
Brazil	10	5	15

Source: Collected by authors based on U.S. Energy Information Administration 2023, Bundesnetzagentur, India Power Report, South Africa Energy Report and Brazil Energy Overview

Table 4 highlights the impact of power supply stability on digital technology implementation in different countries, with a focus on regions like India and South Africa, where power outages are more frequent and last longer. This instability can severely disrupt digital technology projects, causing hardware damage, data loss, and system crashes, which, in turn, can lead to project delays and increased operational costs. For companies operating in these regions, the unpredictable power supply poses a significant risk to maintaining seamless digital operations. To address these challenges, businesses may need to invest in uninterruptible power supply (UPS) systems, backup generators, and robust disaster recovery solutions. These measures not only safeguard hardware and ensure data integrity but also support business continuity by reducing the impact of power disruptions, thus helping to maintain the progress of digital initiatives.

RESULTS

To address the challenges multinational companies, face when implementing digital technologies globally, they need to adopt multi-level and multi-angle strategies to overcome infrastructure differences, regulatory compliance issues, talent shortages, and cultural differences. The following are countermeasures that companies should take at different levels to ensure the successful implementation of digital technologies.

1. Technology localization

To address the varying technology infrastructures across countries, multinational companies must adapt their technology solutions to local conditions. This involves creating lightweight versions of software that are optimized for areas with limited network connectivity or lower bandwidth. Collaborating with local Internet Service Providers (ISPs) can help enhance network stability and speed, ensuring reliable technology performance. Additionally, implementing data compression techniques and leveraging edge computing can reduce dependence on network connectivity, which is crucial in regions with weaker infrastructure. These measures help prevent business interruptions caused by network instability and ensure that digital solutions remain effective and accessible in diverse markets. By tailoring technology to local conditions and working with local partners, companies can better support global operations and mitigate the challenges posed by varying infrastructure capabilities.

2. Strengthen training and talent development

Talent shortages in developing regions present significant challenges to the successful implementation of digital technologies. To address this, companies should invest in comprehensive and well-structured training programs aimed at enhancing the digital skills and technical expertise of local employees. These programs should combine theoretical knowledge with practical training, enabling employees to efficiently use and maintain new systems. Collaborating with local educational institutions, technical training centers, and industry experts is essential for developing targeted courses that nurture talent and attract more IT professionals to the field. Additionally, companies can bridge local expertise gaps by employing international IT experts through remote work platforms, which provide specialized skills and timely solutions to complex technical issues. By integrating local training initiatives with the strategic hiring of international talent, companies can build a robust, skilled workforce capable of supporting the successful deployment and operation of digital technologies. This dual approach not only helps overcome immediate talent shortages but also drives innovation and growth in diverse global markets. Ultimately, companies can ensure they have the necessary talent to navigate the challenges of digital transformation and enhance their competitive advantage.

3. Regulatory compliance optimization

Regulatory requirements surrounding data privacy and security differ significantly across countries, posing a considerable challenge for multinational companies deploying digital technologies globally. For example, the European Union's General Data Protection Regulation (GDPR) enforces strict rules on data collection, storage, and processing, while other regions, such as the United States or parts of Asia, may have less stringent or varied standards. To successfully navigate this complex regulatory landscape, companies must ensure that their digital solutions comply with the specific legal requirements of each country where they operate. This often requires hiring legal experts with a deep understanding of local regulations to help localize technology and ensure adherence to compliance standards. Additionally, establishing a global data governance framework is essential for standardizing data management practices across different regions while mitigating compliance risks. Regular internal audits, compliance checks, and updates to policies are also necessary to stay aligned with evolving regulations. By adopting a proactive approach to managing regulatory compliance, companies can avoid costly fines, legal disputes, and operational disruptions, ensuring smooth and lawful business operations in multiple markets while fostering trust and accountability in their use of digital technologies.

4. Cultural Adaptation

Cultural differences present a significant challenge for multinational companies when promoting digital technologies across diverse global markets. The acceptance and integration of new technologies can vary widely based on cultural backgrounds, work habits, and management styles. To effectively address these differences, companies must develop tailored technology promotion strategies that consider the unique cultural characteristics of each country. For instance, in markets with conservative attitudes towards technology, a gradual introduction supported by extensive training and hands-on assistance can help employees adapt to new systems over time. Conversely, in regions with high technology acceptance, companies can accelerate their digital transformation efforts to quickly capitalize on the technological enthusiasm. Additionally, fostering cultural diversity within the organization and forming cross-cultural teams can facilitate smoother technology implementation by bridging cultural gaps and minimizing conflicts. By embracing and addressing cultural nuances, companies can enhance the effectiveness of their technology deployments, ensuring better acceptance and integration in varied international markets.

5. Investment in Infrastructure

Addressing infrastructure weaknesses in developing countries is crucial for successful technology implementation. Multinational companies should consider investing in local infrastructure to improve the overall technological environment. This could include constructing local data centers to enhance data transmission speed and network stability. Additionally, providing essential equipment such as uninterruptible power supply (UPS) systems and backup generators can

help manage unstable power supplies and ensure continuous operation during outages. Collaborating with local governments and infrastructure providers to support the development of Internet and power infrastructure can also contribute to long-term improvements in technological capabilities. By making these strategic investments, companies not only address immediate infrastructure challenges but also contribute to the broader advancement of technological resources in the regions they operate, ultimately supporting more reliable and efficient technology deployment.

6. Establish a risk management mechanism

To effectively navigate the uncertainties associated with global technology implementation, multinational companies must establish a comprehensive and robust risk management mechanism. This includes creating detailed data backup and disaster recovery plans designed to address sudden technical failures, data breaches, or other disruptions that could impact business operations. Ensuring business continuity requires not only having these plans in place but also regularly testing and updating them to adapt to new threats. Additionally, companies should actively monitor and respond to policy changes across different markets to mitigate risks associated with evolving legal and regulatory landscapes. Implementing proactive measures, such as conducting regular risk assessments and engaging in scenario planning, helps companies anticipate potential challenges and prepare appropriate responses. By incorporating these strategies into their operational framework, companies can enhance the efficiency and stability of their digital technologies, effectively manage unforeseen events, and ensure ongoing resilience in a dynamic global environment. This approach helps minimize disruptions and supports sustained business performance across various markets.

CONCLUSION

In the context of globalization, multinational companies face many challenges in implementing digital technologies, which involve both technical aspects and regulations, talent and culture. Differences in technical infrastructure are a major challenge, as network speeds, data storage capabilities and computing resources vary from region to region. Such differences may cause the technology to not work effectively in some regions or require additional adjustments to ensure its consistency and stability globally. In addition, the complexity of regulatory compliance requirements also brings troubles to multinational companies. Countries have different regulations on data privacy, cybersecurity and digital transactions, and companies need to constantly update and adjust their digital strategies to meet the legal requirements of different markets. This not only increases compliance costs but may also affect the operational efficiency of companies in the global market. Therefore, when promoting digital transformation, companies must develop a comprehensive compliance strategy to avoid legal risks and ensure the smooth development of business.

In addition, local talent shortages and cultural differences are also important challenges faced by multinational companies. In many markets, especially developing countries, the shortage of technical talent may lead to difficulties in the process of technology implementation. To meet this challenge, companies need to invest in the training and development of local talents, establish an effective knowledge transfer mechanism, and consider working with local educational institutions to cultivate future technical talents. Cultural differences cannot be ignored either. Different cultural backgrounds will affect employees' acceptance and usage habits of digital technology. Companies should design technical solutions that meet local needs based on the cultural characteristics of each region and implement customized user training to improve the efficiency of technology use. Future research should further focus on the adaptability of technology in specific market environments and explore how to formulate more targeted strategies based on the actual conditions of different regions. This will help provide multinational companies with more precise solutions and promote their successful digital transformation in the global market. By gaining a deep understanding of

these market environments, companies can not only optimize their global strategies, but also improve operational efficiency and market competitiveness in different regions.

REFERENCES

Liang, T. P., You, J. J., & Liu, C. C. (2010). A resource-based perspective on information technology and firm performance: a meta analysis. *Industrial Management & Data Systems*, *110*(8), 1138-1158.

Bessen, J. (2018). *AI and jobs: The role of demand* (No. w24235). National Bureau of Economic Research.

Brynjolfsson, E., & McElheran, K. (2016). The rapid adoption of data-driven decision-making. *American Economic Review*, *106*(5), 133-139.

Irani, Z., Abril, R. M., Weerakkody, V., Omar, A., & Sivarajah, U. (2023). The impact of legacy systems on digital transformation in European public administration: Lesson learned from a multi case analysis. *Government Information Quarterly*, *40*(1), 101784.

Pahlavan, K., Krishnamurthy, P., & Geng, Y. (2015). Localization challenges for the emergence of the smart world. *IEEE Access*, *3*, 3058-3067.

Zhang, S., Pandey, A., Luo, X., Powell, M., Banerji, R., Fan, L., ... & Luzcando, E. (2022). Practical adoption of cloud computing in power systems—Drivers, challenges, guidance, and real-world use cases. *IEEE Transactions on Smart Grid*, *13*(3), 2390-2411.

IT Workforce Labor Market Trends Report: 2023 https://www.gartner.com/en/documents/4665399

World Energy Outlook 2023 https://www.iea.org/reports/world-energy-outlook-2023

Cohen, B., Hall, B., & Wood, C. (2017). Data Localization Laws and Their Impact on Privacy, Data Security and the Global Economy. *Antitrust*, *32*, 107.

Kuan, Z., & Pakhnenko, O. M. (2022). Research on China's cross-border e-commerce based on the background of digital technology.

Kamara, R. D., Leonard, S., & Haines, R. (2017). Enhancing the capabilities of municipalities for local economic development through skills training.

Steidl-Müller, L., Hildebrandt, C., Raschner, C., & Müller, E. (2019). Challenges of talent development in alpine ski racing: a narrative review. *Journal of sports sciences*, *37*(6), 601-612.

McKinsey Year in Review 2023 https://www.mckinsey.com/featured-insights/2023-year-in-review

Kergroach, S., & Bianchini, M. M. (2021). *The digital transformation of SMEs*. OECD Publishing.

The Digital Transformation of SMEs https://www.oecd.org/en/publications/the-digital-transformation-of-smes_bdb9256a-en.html

Speedtest Global Index – Internet Speed around the world https://www.speedtest.net/global-index

U.S. Energy Information Administration (EIA). Electricity Data. https://www.eia.gov/electricity/data.php

Kim, Y. Y. (2017). Cross-cultural adaptation. *Oxford research encyclopedia of communication*.

Robertson, P. (1997). Integrating legacy systems with modern corporate applications. *Communications of the ACM*, *40*(5), 39-46.

Hampden-Turner, C., Trompenaars, F., & Hampden-Turner, C. (2020). *Riding the waves of culture: Understanding diversity in global business*. Hachette UK.

Iso, I. (2009). Risk management–Principles and guidelines. *International Organization for Standardization, Geneva, Switzerland*.

ПРОБЛЕМИ ВПРОВАДЖЕННЯ ЦИФРОВИХ ТЕХНОЛОГІЙ НА МІЖНАРОДНИХ ПІДПРИЄМСТВАХ

Kuan Zhang
Сумський державний університет,
Україна

Мета цього дослідження полягає в тому, щоб визначити та проаналізувати ключові проблеми, з якими стикаються транснаціональні компанії при впровадженні цифрових технологій на різних ринках, і запропонувати стратегії пом'якшення цих перешкод. Впровадження цифрових технологій у багатонаціональних підприємствах має важливе значення для підтримки конкурентоспроможності та ефективності роботи. Однак цей процес несе кілька проблем, особливо з точки зору технологічної інфраструктури, дотримання нормативних вимог, браку талантів і культурних відмінностей. В умовах глобалізації багатонаціональні компанії стикаються з багатьма проблемами у впровадженні цифрових технологій, які включають як технічні аспекти, так і правила, талант і культуру. Відмінності в технічній інфраструктурі є серйозною проблемою, оскільки швидкість мережі, можливості зберігання даних і обчислювальні ресурси відрізняються від регіону до регіону. Такі відмінності можуть спричинити неефективну роботу технології в деяких регіонах або вимагати додаткових налаштувань для забезпечення її узгодженості та стабільності в усьому світі. Крім того, складність нормативних вимог також приносить проблеми транснаціональним компаніям. Країни мають різні правила щодо конфіденційності даних, кібербезпеки та цифрових транзакцій, і компаніям необхідно постійно оновлювати та коригувати свої цифрові стратегії відповідно до правових вимог різних ринків. Це не тільки збільшує витрати на відповідність, але й може вплинути на ефективність роботи компаній на світовому ринку. Тому, просуваючи цифрову трансформацію, компанії повинні розробити комплексну стратегію відповідності, щоб уникнути юридичних ризиків і забезпечити плавний розвиток бізнесу. Висновки показують, що компанії повинні приймати локалізовані рішення, такі як розробка полегшеного програмного забезпечення, посилення навчальних програм і забезпечення відповідності регіональним нормам щодо даних, щоб допомогти транснаціональним компаніям успішно орієнтуватися в складнощах глобального впровадження цифрових технологій.

Ключові слова: транснаціональні компанії, цифрові технології, виклики, пропозиції