Available on: https://jmrr.ep-journals.org/ E-ISSN: 3051-3588 P-ISSN: 3051-357X

Journal of Management Research and Review
Volume: 02 Issue: 03 March-2026

Digital Transformation Readiness Level of Enterprises in the Mekong Delta

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Published Date: March 17, 2026 **Article DOI: 10.65150/EP-jmrr/V2E3/2026-01**

ABSTRACT: This paper analyzes the digital transformation readiness of enterprises in the Mekong Delta utilizing secondary data sourced from the Ministry of Information and Communications, the General Statistics Office, and the Vietnam Chamber of Commerce and Industry for the 2020 - 2024 period. The findings reveal that while regional enterprises have exhibited positive shifts, their digital readiness remains below the national average, reflecting significant disparities in technological infrastructure, human resources, and innovation investment. Four primary determinants were identified as having a predominant influence: (1) technical infrastructure and network connectivity, (2) digital human resources and proficiency, (3) support policies and accessibility to capital, and (4) digital awareness and leadership capacity. By referencing international models, this study proposes a digital transformation capacity evaluation framework comprising four criteria clusters: digital infrastructure, digital human resources, technological application, and digital strategic governance. The research findings provide a robust scientific foundation for policy formulation, supporting Mekong Delta enterprises in bolstering their competitiveness and aiming toward sustainable digital economic development and international integration.

KEYWORDS: Digital transformation; digital readiness; small and medium-sized enterprises; Mekong Delta; digital technology capacity.

1. INTRODUCTION

Digital transformation has become a decisive driver of enterprise competitiveness and sustainable development in the era of Industry 4.0. Vietnam is accelerating the implementation of its National Digital Transformation Strategy to 2030, targeting a digital economy that contributes 30% of GDP (Ministry of Information and Communications, 2024). Yet, readiness for DT remains uneven across regions, with the Mekong Delta—an area of major agricultural output—lagging behind due to limited digital infrastructure, technological workforce, and innovation investment (Nguyen-Thi, Le, & Nguyen-Ly, 2024).

Nguyen and Dang (2025) highlight that Vietnamese enterprises generally demonstrate moderate readiness, with small and medium-sized enterprises (SMEs) facing significant constraints in resources and long-term strategies. In the Mekong Delta, small enterprise scale, low technological capacity, and restricted access to digital infrastructure have slowed transformation compared to urban centers (Phuong, 2020). Quynh's (2024) assessment of the Digital Transformation Readiness Index (DTRI) reports an average score of only 3.2/5, reflecting insufficient awareness and investment relative to potential.

Consequently, evaluating the digital transformation readiness of enterprises in the Mekong Delta is of practical significance. Such an assessment facilitates the identification of barriers and the formulation of solutions to enhance digital competitiveness for this key economic region, aligning with the national digital economy development orientation.

2. RESEARCH CONTENT

2.1 Theoretical foundations and analytical framework

2.1.1 The concept of "digital transformation readiness level"

The concept of digital transformation readiness is understood as the overall capability of an organization in preparing, adapting, and effectively implementing digital technologies to achieve strategic objectives and enhance operational efficiency (Soomro, Hizam-Hanafiah, & Abdullah, 2020). According to Michelotto and Joia (2024), this readiness level reflects the organization's ability to integrate technology, innovate processes, develop digital skills for its workforce, and build a sustainable digital culture. In other words, this concept is an indicator of digital maturity, representing the enterprise's evolutionary stage on its transformation path from traditional processes to an operation model based on data and technology (Silva, Saraiva, & Mamede, 2022).

Recent studies emphasize that digital transformation readiness does not solely depend on technological infrastructure but is also closely linked to leadership strategy, organizational culture, human resource capabilities, and innovation capacity (Sánchez & Zuntini, 2018). Kryukov, Shakhgeldyan, and Kiykova (2022) proposed the DREAMY model (Digital Readiness Assessment Model for Enterprises) to measure digital

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readiness capability based on five main pillars: (1) digital strategy, (2) technological infrastructure, (3) data governance, (4) human capabilities, and (5) innovation processes. A high level of readiness indicates that enterprises can rapidly absorb new technologies, transform digital value into competitive advantages, and sustain long-term growth in the digital economy.

Thus, in the context where Vietnamese enterprises in general and those in the Mekong Delta region in particular are facing pressure to transform to adapt to globalization and climate change, assessing digital transformation readiness becomes a crucial indicator.

2.1.2 Popular digital transformation readiness assessment models

Globally, many international organizations have developed assessment frameworks to measure the digital development and transformation readiness of countries, organizations, and enterprises. The three most widely influential models currently include: the Digital Economy and Society Index (DESI) by the European Union, the Digital Economy Framework by the World Bank, and the Asia-Pacific regional digital transformation guidelines implemented by the Asian Development Bank (ADB).

Digital Economy and Society Index (DESI). The European Commission developed DESI as a composite index to monitor the progress of member states in the digital economy and society. DESI measures performance based on five main dimensions: (i) connectivity, (ii) human capital and digital skills, (iii) use of internet services, (iv) integration of digital technology by businesses, and (v) digital public services (European Commission, 2024). Each dimension includes specific quantitative indicators such as broadband coverage rates, the proportion of people with basic digital skills, and the level of cloud computing technology adoption by businesses. According to Bruno et al. (2023), DESI is currently a leading reference tool for non-EU countries when developing digital economy development strategies, thanks to its unified data structure and high international comparability.

The World Bank Digital Economy Framework. Unlike DESI, the World Bank does not use a single index but implements the Digital Economy Framework (DEF), a multi-dimensional assessment framework for countries' digital development and readiness. DEF focuses on five pillars: (i) digital infrastructure, (ii) digital workforce and skills, (iii) digital finance, (iv) digital enterprises, and (v) digital government (World Bank, 2023). These pillars have been applied in studies such as the Vietnam Digital Economy Report 2023, which identifies both opportunities and challenges for Vietnam in the process of global digital integration. According to Chong, Puah, and Teh (2025), DEF serves as a foundational model for policy formulation, enabling developing countries to quantify digital gaps and design effective strategies.

ADB Digital Transformation Insight. The Asian Development Bank (ADB) has published a series of reports titled Digital Transformation Insights (ADB, 2021), which propose guiding principles and indicators to support developing economies in advancing digital transformation. This framework emphasizes six domains: (i) national policies and strategies, (ii) infrastructure and connectivity, (iii) digital skills and human resources, (iv) innovation, (v) cybersecurity, and (vi) digital inclusion (Smit, Fu, & Autio, 2021). Although not a quantitative index like DESI, the ADB framework provides strategic guidance, enabling governments and enterprises in the Asia-Pacific region to self-assess digital readiness, particularly in industry, agriculture, and services.

Together, the three models - DESI, DEF (World Bank), and ADB Insights - constitute multi-layered assessment frameworks that can be referenced and adapted to Vietnam's context. Within the scope of this study, the authors adopt the World Bank DEF as the primary analytical approach, while drawing on selected indicators from DESI and ADB to construct a comprehensive framework for evaluating digital transformation readiness among enterprises in the Mekong Delta.

2.1.3 Proposed analytical framework for the study

This study proposes an analytical framework tailored to the practical context of enterprises in the Mekong Delta, building upon and integrating international models of digital transformation assessment. These include the Digital Economy and Society Index (DESI) of the European Union, the Digital Economy Framework (DEF) of the World Bank, and the Digital Transformation Insights guidelines of the Asian Development Bank (ADB). The framework is constructed using secondary data collected from the General Statistics Office (GSO), the Ministry of Information and Communications (MIC), the Vietnam Chamber of Commerce and Industry (VCCI), and enterprise reports from 2020–2024, thereby ensuring an objective reflection of digital transformation readiness in the region.

The framework inherits the structure of DESI in comprehensively evaluating aspects of connectivity, skills, and technology integration into enterprise operations (European Commission, 2024). It also applies the multi-pillar approach of the World Bank DEF, emphasizing the roles of infrastructure, human capital, enterprises, and government in the digital transformation process (World Bank, 2023). In addition, it references ADB's Digital Transformation Insights with its focus on policy, cybersecurity, and digital inclusion, ensuring adaptability to the specific characteristics of the Mekong Delta, where small and medium-sized enterprises dominate, financial capacity is limited, and dependence on traditional industries remains high (Smit, Fu, & Autio, 2021).

By synthesizing the aforementioned methodological frameworks, this study proposes four primary clusters of criteria to evaluate the digital transformation readiness of enterprises in the Mekong Delta. First, digital infrastructure reflects connectivity capabilities and investment levels in technological platforms, encompassing broadband internet access, cloud computing adoption, corporate databases, and operational automation (de Figueiredo, 2024). Second, digital human resources represent the digital competencies and skills of the workforce, serving as the decisive factor in an organization's capacity to absorb and deploy emerging technologies (Khoa, 2025). Third, technological application assesses the utilization of management systems such as ERP and CRM, e-commerce integration, and the implementation of digital tools across the production and business value chains (Trang, 2024). Finally, digital governance and strategy examine leadership commitment and proficiency in planning, organizing, and supervising the digital shift, alongside the integration of digital objectives into long-term corporate strategies (Chong, Puah, & Teh, 2025). These four pillars constitute a comprehensive analytical framework, enabling the quantification and benchmarking of digital readiness across the core dimensions of technology, people, and management. This approach is not only tailored to the socio-economic conditions of the Mekong Delta but also provides a robust scientific foundation for policy formulation and enterprise support within the national digital transformation agenda.

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2.2 Current state of digital transformation readiness among enterprises in the Mekong Delta

2.2.1 Overview of regional digital transformation outcomes

Table 1. Comparison of digital transformation indicators: Mekong Delta vs. national average (2023)

Evaluation criteria	National average	Mekong Delta	Leading region/province
1. Provinces in top 10 DTI 2023	10 provinces/cities	1 city (Can Tho)	Da Nang (Ranked 1st)
2. The adoption rate of formal digital transformation strategies (%)	≈ 40%	< 30%	Southeast region: > 40%
3. In-house IT department (%)	25.1%	18.6%	Red river delta: ~27%
4. Proportion of SMEs (%)	96.7%	97.4%	—
5. Strongest tech application fields	Public services, E-commerce	Digital agriculture, logistics	Industry & smart cities
6. Key policy orientations	Digital gov, national digital economy	Digital ag-business, regional digital infra	Urban innovation hubs

(***Sources:*** *Ministry of Information and Communications (2023); VCCI (2023); General Statistics Office (2024); Nguyen & Dang (2025))*

Table 1 illustrates several key indicators reflecting the digital transformation (DX) readiness and outcomes of the Mekong Delta relative to the national average in 2023. The data reveals that while national DX trends show positive growth, the Mekong Delta maintains a discernible gap compared to more developed regions such as the Southeast and the Red River Delta. Notably, Can Tho City stands as the region's sole representative within the Top 10 of the Digital Transformation Index (DTI) (MIC, 2023). Conversely, the majority of other provinces, including Ben Tre, Soc Trang, Tra Vinh, Bac Lieu, and Hau Giang, remain outside the high-index group, reflecting constraints in technological investment, human resource proficiency, and corporate readiness. The adoption rate of formal digital transformation strategies in the Mekong Delta is below 30%, significantly lower than the national benchmark of 40% (VCCI, 2023). Furthermore, the proportion of enterprises maintaining dedicated in-house IT departments reached only 18.6%, compared to the 25.1% national average (GSO, 2024). These figures underscore that digital literacy and technological governance capacity remain primary impediments to the region's digital transition. Nevertheless, the Mekong Delta possesses substantial potential for digital economic development, particularly within smart agriculture, logistics, and e-commerce. Provinces such as An Giang, Dong Thap, and Kien Giang have initiated support programs for SMEs to integrate digital technologies into agricultural value chains, thereby enhancing regional productivity and competitiveness. Consequently, the region's digital readiness is exhibiting a gradual upward trajectory, pivoting from the "awareness" phase toward "active implementation" (Nguyen & Dang, 2025).

2.2.2 Digital readiness by enterprise scale

The degree of digital transformation readiness is fundamentally contingent upon the scale of operation, being directly influenced by financial resources, managerial expertise, and technological accessibility. Following the World Bank (2023) classification, enterprises are categorized by workforce size - small (5–19 employees), medium (20–99 employees), and large (≥100 employees) - to facilitate a comprehensive examination of business conditions, including technological and governance factors. This taxonomy provides a robust analytical basis for evaluating disparities in the capacity to implement digital initiatives.

In the Vietnamese context, empirical research conducted on a sample of 352 enterprises indicates that SMEs typically reside in the nascent stages of "digital maturity" compared to their larger counterparts, particularly regarding the integration of digital management systems and automated workflows. Larger corporations often leverage superior capital reserves and specialized technical personnel, enabling a higher degree of deployment for sophisticated solutions such as ERP systems or advanced data analytics (Nguyen & Dang, 2025). This discrepancy highlights the significant resource-based barriers uniquely confronting SMEs.

Further scholarly reviews on Vietnamese SMEs identify multifaceted challenges in the digital transition, including a deficit in internal digital competencies, hurdles in mobilizing capital for technological investment, and a lack of long-term strategic vision. These impediments collectively decelerate the pace of digitalization, especially in regions like the Mekong Delta, where SMEs constitute the backbone of the economy. Consequently, while comprehensive national statistics disaggregated by firm size remain limited, existing academic literature reveals a distinct trend: large enterprises generally exhibit greater readiness and undergo digital transformation more rapidly than SMEs. Meanwhile, SMEs - particularly those in the Mekong Delta - require intensified support in digital literacy, capital facilitation, and strategic planning to bolster their digital capacity and bridge the prevailing gap with larger firms.

2.2.3 Digital readiness by sector of actibity

In the Mekong Delta, the digital transformation readiness of enterprises exhibits significant variance across different sectors, driven by industry-specific characteristics and varying degrees of technological accessibility. This divergence reflects the necessity of aligning technological adoption with the unique production and management workflows inherent to each field.

Regarding the agricultural sector, comprehensive reports on digital agriculture indicate that the Mekong Delta is currently in a transitional phase of evaluating and implementing digital technologies to enhance traceability, environmental monitoring, and production management efficiency (Nguyen, Vu Thi, Nguyen & Giles, 2023). These studies underscore the critical role of tools such as geographic information systems (GIS), IoT sensors, and data platforms. However, they lack empirical quantitative data regarding the adoption rates within agricultural establishments in the region. This data deficiency hampers a precise assessment of the overall digital transformation readiness within this pivotal sector.

In processing and logistics, academic research and national situational overviews suggest that this sector faces multifaceted challenges in integrating digital technology into supply chain and operational management. For instance, research on smart logistics in the Mekong Delta highlights the potential for developing intelligent systems through IoT, big data, and cloud computing. Simultaneously, it identifies constraints such as enterprise scale, human resource limitations, and fragmented value chain linkages as factors decelerating the pace of digital transformation implementation (Tran Trung & Phan Xuan, 2023). Furthermore, qualitative studies within the Vietnamese logistics industry confirm that digital

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transformation is an inevitable trend for bolstering competitiveness and optimizing operational costs, yet they stop short of providing enterprise-level quantitative metrics or specific adoption percentages.

As for the service sector, the majority of studies and reports focus on describing the application of technologies, such as electronic payments, e-commerce, and Customer relationship management (CRM), within Vietnamese service enterprises in general. These sources seldom disaggregate digital transformation readiness by the Mekong Delta region or specific sub-sectors, leading to a profound lack of granular data concerning regional disparities.

Table 2. Digital transformation readiness by sector in the Mekong Delta

Sector	Digital readiness level (General sssessment)	Key features / Primary applications	Principal challenges
Agriculture	At the evaluation and pilot phase; lacking specific quantitative data on adoption rates.	Application of GIS, IoT, and data platforms for production management, traceability, and environmental monitoring.	Deficit in tech-savvy labor, high investment costs, and lack of integrated inter-regional data.
Processing	Moderate readiness; gradual integration of technology into production and supply chains.	Process automation, digital-driven supply chain management, and digitalization of operational data.	Prevalence of small-scale enterprises, capital constraints, and weak logistics connectivity.
Services	Relatively high readiness in urban hubs (Can Tho); more restricted in other provinces.	Adoption of electronic payments, e-commerce, customer relationship management, and digital marketing.	Lack of disaggregated regional statistics; urban-rural digital divide.
Logistics	Low readiness; currently in the nascent stages of the digital transformation process.	Initial adoption of IoT, big data, and TMS/WMS for warehouse and transportation management.	Absence of regional logistics hubs, weak enterprise-seaport linkages, and inadequate tech infrastructure.

*(**Sources:** Synthesized from CGSpace (Nguyen et al., 2023); ResearchGate (Tran Trung & Phan Xuan, 2023); MDPI (2024))*

In conclusion, while there is substantial scholarly evidence and official reporting regarding the significance and constituent factors of digital transformation across various sectors, specific quantitative evidence regarding the adoption rates of digital technology by industry in the Mekong Delta remains elusive in accessible academic sources. This highlights a significant secondary data gap, while simultaneously presenting an opportunity for further empirical research. Future studies should focus on collecting primary quantitative data to facilitate a more comprehensive and rigorous evaluation of digital readiness across diverse economic sectors in the region.

2.2.4 Intra-regional digital divide

The digital divide among provinces within the Mekong Delta reflects disparities in accessibility, application capacity, and the efficacy of leveraging digital technologies across different localities. According to the Ministry of Information and Communications (MIC, 2023), the national digital transformation index (DTI) reveals a stark contrast within the region: Can Tho city emerges as the sole representative from the Mekong Delta in the national Top 10, whereas other provinces such as Tra Vinh, Soc Trang, Bac Lieu, and Hau Giang remain in the average or low-tier groups. This intra-regional imbalance underscores discrepancies in infrastructural capacity, human resources, and digital policy frameworks.

Reports from the Vietnam Chamber of Commerce and Industry (VCCI, 2023) indicate that enterprises in Can Tho and Long An exhibit significantly higher rates of management technology adoption and digital platform participation compared to their regional counterparts. Conversely, localities with economies primarily anchored in traditional agriculture, such as Tra Vinh and Soc Trang, face substantial hurdles in digital implementation, particularly within the SME sector. These limitations stem largely from a deficit in IT personnel, restricted investment resources, and a lack of tailored support policies for local businesses.

From a scholarly perspective, Le and Tran (2022) argue that the digital divide in Vietnam originates not only from infrastructural gaps but also from inequalities in digital skills and workforce quality. Survey results from the General Statistics Office (GSO, 2024) further corroborate that the proportion of IT-skilled labor in the Mekong Delta remains below the national average, thereby constraining technological integration within enterprises. This analysis aligns with the findings of Pham, Nguyen, and Doan (2024), who suggest that the digital divide across Vietnam's economic regions, including the Mekong Delta, is primarily driven by the friction between central urban hubs and peripheral areas where digital infrastructure and internet penetration remain limited.

Consequently, three primary drivers of the digital divide within the Mekong Delta can be identified. First, disparities in digital infrastructure and connectivity, with core provinces like Can Tho and Long An enjoying significantly higher coverage and connection speeds than coastal provinces. Second, a gap in human capital and digital literacy, characterized by a low percentage of IT-trained labor in outlying provinces. Third, variations in local government investment and commitment to digital agendas, which directly influence the pace of technological adoption in the private sector.

Synthesizing the aforementioned evidence, it is evident that a significant intra-regional digital divide persists within the Mekong Delta. Can Tho and Long An have emerged as high-readiness hubs, while remaining provinces linger in the nascent stages of transformation. To bridge this gap, a holistic policy framework is required to promote equitable infrastructural development, enhance the digital competencies of the local workforce, and intensify support for SMEs. Such measures will not only balance development across localities but also bolster the overall competitiveness and digital economic integration of the Mekong Delta in the forthcoming period.

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2.3 Factors influencing digital readiness

2.3.1 Technical infrastructure and network connectivity

Digital technical infrastructure and network connectivity constitute the foundational determinants of an enterprise's digital transformation readiness. According to Nguyen and Dang (2025), the capacity to implement digital transformation is heavily contingent upon the development of telecommunications infrastructure, access to high-speed Internet, and the quality of mobile networks - factors that facilitate technological accessibility, digital governance implementation, and efficient data integration. In the context of the Mekong Delta, although internet coverage has improved in recent years, a significant disparity persists between urban centers (Can Tho, Long An) and rural or coastal provinces (Tra Vinh, Soc Trang, Bac Lieu) (Nguyen, Vu Thi, Nguyen & Giles, 2023).

Data from the Ministry of Information and Communications (MIC, 2023) indicates that Vietnam's internet penetration rate has reached 78% of the population; however, the Mekong Delta lags behind at approximately 72 - 74%. While 4G mobile networks have been widely deployed, the bandwidth quality and data transmission speeds in many provinces fail to meet the requirements of sophisticated digital applications such as cloud computing, smart supply chains, or big data analytics. A report by Vu Bao Nguyen et al. (2023) points out that enterprises in the Mekong Delta's coastal areas encounter significant obstacles when deploying digital agricultural solutions due to weak data transmission and sensor connectivity, exacerbated by specific weather conditions and topographical challenges.

Similarly, research by Hai (2025) on the digital capacity of organizations in the Mekong Delta reveals that rural enterprises and educational institutions face constraints in maintaining stable internal IT systems due to high equipment and maintenance costs. This undermines the efficacy of management digitalization platforms (ERP, CRM) and restricts information integration across units. Furthermore, Anh (2021) posits that Vietnam must prioritize regional digital infrastructure investment strategies to bridge the urban-rural divide and promote the development of regional data centers catering to SMEs.

Recent studies also emphasize the correlation between technical infrastructure and an enterprise's technological absorptive capacity. Duong et al. (2025) demonstrate that IT infrastructure readiness is positively correlated with the adoption of digital innovation, particularly among small-scale enterprises in non-central areas. In the Mekong Delta, limitations regarding power grid stability, data transmission lines, and initial capital expenditure for hardware prevent many firms from fully transitioning to digital management workflows.

In conclusion, technical infrastructure and network connectivity play a pivotal role in elevating the digital readiness of Mekong Delta enterprises. To enhance this factor, it is imperative to implement regional telecommunications development strategies, establish local data centers, provide financial subsidies for SMEs' equipment investment, and expand high-speed internet coverage. Upgrading technical infrastructure is not merely a prerequisite for corporate digital transformation but also the cornerstone for sustainable digital economic development in the Mekong Delta.

2.3.2 Human resources and digital proficiency

Human resources and digital proficiency constitute one of the most direct and profound determinants influencing an enterprise's digital transformation readiness. According to Nguyen, Pham, and Trinh (2022), the development of a digital workforce extends beyond technical literacy; it encompasses a data-driven mindset, analytical capabilities, and adaptability within digital environments, foundational elements that enable enterprises to integrate digital technology into production, governance, and service sectors. However, within the Mekong Delta, the digital proficiency of the labor force remains generally lower than the national average (Hai, 2025; Bich, 2025).

Data from the General Statistics Office (GSO, 2024) indicates that the proportion of trained labor with IT certifications in the Mekong Delta stands at only 5.8%, trailing significantly behind the national benchmark of 8.2%. This implies that a vast majority of the regional workforce lacks essential digital skills, creating substantial bottlenecks for technological deployment within enterprises. Nguyen and Dang (2025) posit that this deficit is a primary driver behind the reduced capacity of firms, particularly SMEs, to adopt and absorb technological innovations. Furthermore, research by Thuy and Thanh (2023) on Vietnamese SMEs confirms that employee digital readiness is a significant predictor of work performance and adaptability to digital shifts. Enterprises implementing periodic digital skill training programs exhibit DX efficiency levels 20–25% higher than those without such initiatives (Thuy & Thanh, 2023).

Concurrently, Nga and Tam (2025) emphasize that cultivating digital human capital must be viewed as a cornerstone of modern Human Resource Management (HRM). This necessitates a strategic pivot for HR departments - transitioning from administrative functions to strategic orientation to bolster corporate competitiveness. Regarding the Mekong Delta, both Hai (2025) and Bich (2025) identify limitations in the quality of local vocational and higher education as a major barrier. Private universities and colleges in the region have yet to offer specialized curricula in digital transformation, artificial intelligence (AI), or big data analytics, forcing local firms to rely on technical talent from major urban hubs like Ho Chi Minh City. Additionally, Nguyen et al. (2023) note that while the demand for digital talent in agriculture and logistics is surging, the regional labor supply remains inadequate to meet these evolving requirements.

In summary, human resources and digital proficiency are the linchpins of digital transformation readiness for Mekong Delta enterprises. To enhance this capacity, it is imperative to modernize vocational training programs to align with industry demands, incentivize corporate investment in internal upskilling, and foster collaborative networks between enterprises, educational institutions, and local authorities. Such synergy is essential for developing a sustainable digital talent ecosystem in the region.

2.3.3 Support policies and accessibility to technological capital

Support policies and the accessibility of technological capital are decisive factors in determining the digital transformation readiness of enterprises, particularly in the Mekong Delta, where over 97% of businesses are classified as SMEs (GSO, 2024). According to the Ministry of Planning and Investment (MPI, 2024), the national program for digital transformation support for SMEs (SMEdx) has been deployed nationwide, engaging over 100,000 enterprises since 2021. However, firms in the Mekong Delta continue to exhibit low participation and benefit rates, primarily due to infrastructural constraints and limited access to program information.

VCCI (2023) reports that the majority of small enterprises in the region encounter significant hurdles when attempting to access technological investment capital and financial support packages for innovation. Furthermore, a World Bank (2023) report indicates that Vietnamese enterprises,

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in general, face restricted access to credit specifically earmarked for technological advancement compared to their counterparts in the Southeast Asian region. In addition, Tran and Pham (2024) point out that investment in technology among Mekong Delta enterprises is substantially lower than in the Southeast region, with firms largely relying on self-financed capital.

According to Nguyen and Dang (2025), the efficacy of support policies is fundamentally dependent on implementation capacity at the local level. The absence of regional innovation hubs, financial incentive mechanisms, and dedicated technological investment funds has resulted in a slower digital transformation pace in the Mekong Delta compared to other developed regions. Consequently, to bolster readiness, it is imperative to promote the decentralization of policy execution, develop regional-level technology funds, and strengthen Public-Private Partnerships (PPP) in digital transformation investment. These measures will not only improve capital accessibility but also catalyze active corporate participation in a sustainable digital transformation process.

2.3.4 Awareness, culture and digital leadership capacity

Awareness, organizational culture, and digital leadership capacity play a centralized role in shaping an enterprise's digital transformation readiness. According to Nguyen and Dang (2025), a leader's ability to align business strategy with digital technology is a prerequisite for proactive adaptation to change. Nhan (2025) demonstrates that digital leadership capacity is strongly correlated with digital business performance ($\beta = 0.42$, $p < 0.001$), thereby affirming the critical roles of an innovative leadership mindset and digital proficiency in successful digital transitions.

Furthermore, an organizational culture oriented toward innovation and continuous learning serves as a vital foundation for enhancing readiness. Leso, Cortimiglia, and Ghezzi (2023) prove that SMEs possessing flexible organizational cultures that encourage creativity achieve higher readiness levels. Similarly, Jewapatarakul and Ueasangkomsate (2024) confirm that a digital culture fosters organizational learning, a key mediating factor in the transformation process. Thuy and Thanh (2023) further supplement this by stating that leadership styles directly influence employee readiness through empowerment and the promotion of innovation.

In the Vietnamese context, Mai, Nguyen, and Ton (2024) observe that following the COVID-19 pandemic, enterprises with an open culture and digitally-oriented leadership adapted more rapidly to market volatility. Regarding the Mekong Delta, although specialized research remains limited, existing evidence suggests that many enterprises still perceive digital transformation as a purely technical task rather than a core development strategy. Consequently, elevating leadership awareness and cultivating a culture of learning and innovation within organizations are prerequisites for bolstering the digital readiness of enterprises in this region.

2.4 Lessons learned and development orientations

2.4.1 Lessons from regions and nation with high digital readiness

International experience indicates that success in digital transformation is not solely contingent upon technological investment but also necessitates robust policy vision, effective coordination capacity, and comprehensive societal engagement. Research by Smit, Autio, and Park (2025) emphasizes that nations with high digital readiness, such as South Korea, Singapore, Estonia, and Denmark - have implemented "digital-by-default" strategies. Under this framework, all public and private sector operations function on digital platforms by default, complemented by policies for lifelong digital skills development, high-speed internet infrastructure investment, and financial incentives for technological innovation. These measures create a conducive environment for both enterprises and citizens to participate in the digital economy (ADB, 2025).

In Singapore, the Smart Nation initiative, launched in 2014, is built upon three core pillars: synchronized digital infrastructure, human-centric innovation, and open-data government. This program has enabled Singapore to maintain its second-place global ranking in the Digital Readiness Index, according to the OECD (2024). In South Korea, an adaptive governance model allows ministries and local authorities to pilot emerging technologies, thereby fostering creativity and flexibility throughout the digitalization process (Meyerhoff Nielsen & Jordanoski, 2023). Estonia is distinguished by its comprehensive digital institutional model, where over 99% of public services are executed online via a national electronic identification (e-ID) system. Reports by Azzopardi et al. (2020) and Rajasekaran (2024) indicate that Estonia's success is predicated on the "once-only" principle, where citizens provide data to the state only once, integrated with a legal framework for data interoperability and universal digital literacy. These nations also maintain national technology investment funds equivalent to 1 - 2% of GDP, supporting SMEs through tax credits, preferential loans, and Public-Private Partnerships (Datsiv, 2025).

From these experiences, three primary lessons can be synthesized for Vietnam in general, and the Mekong Delta in particular: (1) The establishment of a unified digital coordination mechanism and regional data interoperability; (2) The aggressive development of digital skills through lifelong human resource training; (3) The creation of local technological support funds to incentivize corporate digital transformation investment. These measures serve as the essential foundation for elevating digital readiness, aiming toward a comprehensive and sustainable digital economy for the region.

2.4.2 Emerging trends in measuring and enhancing digital capacity

As digital transformation becomes the core catalyst for economic growth, international organizations such as the OECD, World Bank, and ADB have developed various measurement frameworks to evaluate the digital readiness and technological adaptability of enterprises. These frameworks not only provide quantitative instruments but also assist nations and businesses in identifying gaps and prioritizing investments. The OECD (2024) report highlights four primary pillars: (i) digital infrastructure, (ii) human resources and skills, (iii) digital governance, and (iv) innovation and open data. This framework extends beyond measuring mere technological adoption; it assesses the alignment between digital strategy and business models, thereby fostering sustainability throughout the digital transformation process.

According to the World Bank (2024), countries that implement periodic enterprise-level digital capacity assessments, such as Singapore, Estonia, and South Korea - achieve digital transformation efficiency levels 35 - 40% higher than those without formal measurement systems. This disparity stems from the ability to track progress and execute timely strategic adjustments, helping firms overcome challenges such as skill deficits or inadequate infrastructure. Recent research by Mai, Nguyen, and Ton (2024) and Van Can and Dang (2024) indicates a growing trend of integrating digital capacity indices into corporate development strategies, allowing for the granular measurement of factors such as leadership awareness, organizational culture, and innovation. Concurrently, emerging frameworks like the World Bank's Digital Economy Assessment Framework

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(DEAF) and Vietnam's Digital Transformation Index (DTI) are shifting toward data-driven linkages based on real-time enterprise data, rather than relying solely on qualitative surveys, to enhance accuracy and applicability.

In Vietnam, this trend is exemplified by the piloting of the "SME Digital Scorecard" model in the Mekong Delta, designed to quantify enterprise digital capacity on a 100-point scale. This model encompasses five primary criteria: infrastructure, human resources, technology, governance, and market connectivity, enabling SMEs to self-assess and improve (Hoa, 2024). Such developments align with the National Strategy for Digital Economic Development to 2030, which aims to treat digital capacity measurement as a sustainable development indicator (Khoa, 2025). These trends not only bolster competitiveness but also contribute to building a comprehensive digital ecosystem, supporting enterprises in adapting to rapid technological shifts.

2.4.3 Application orientations of the evaluation framework for Mekong Delta enterprises

The application of a digital transformation capacity evaluation framework for enterprises in the Mekong Delta must be tailored to the region's socio-economic characteristics and specific sectoral structures. As the majority of firms in this area are SMEs primarily operating in agriculture, food processing, logistics, and trade services, a customized approach is essential. According to Hoa (2024), implementing a unified evaluation framework enables both regulatory bodies and enterprises to clearly identify their current standing in the digitalization process, thereby establishing investment priorities and appropriate capacity-building solutions. The proposed framework is synthesized from the recommendations of the OECD (2024), the World Bank (2024), and the Ministry of Information and Communications (MIC, 2023), comprising four primary criteria clusters: (i) digital infrastructure and technology, (ii) digital human resources and skills, (iii) digital corporate strategy and governance, and (iv) the efficiency of technological application in production and business operations.

Empirical findings by Hoa (2024), involving 120 small enterprises across Can Tho, An Giang, and Dong Thap, demonstrate a robust correlation between technological investment and digital transformation readiness. Specifically, enterprises allocating over 5% of their annual revenue to technology achieved an average digital capacity score of 65/100, outperforming those with less than 1% investment by 20 points. Furthermore, firms characterized by tech-savvy leadership and an internal culture of innovation recorded superior results in the "digital strategy and governance" category (Mai, Nguyen & Ton, 2024). These findings underscore the pivotal roles of capital investment and leadership in bolstering digital proficiency. The quantification of these criteria through the "SME Digital Scorecard", a collaborative pilot by the Ministry of Planning and Investment and the World Bank, evaluates enterprise readiness on a 100-point scale across five maturity levels: starting, basic, developing, advanced, and leading. Moreover, aligning the enterprise-level evaluation framework with the provincial Digital Transformation Index (DTI) provides a scientific foundation for local authorities to monitor DX progress and formulate targeted support policies. According to the World Bank (2024), nations and economic regions adopting multi-level monitoring mechanisms (from enterprise to provincial and national levels) enhance the efficacy of technology policies by over 30% compared to single-tier assessment models.

Consequently, the strategic orientation for the Mekong Delta during the 2025 - 2030 period involves establishing a regional digital database to synchronize information across provinces while promoting Public-Private Partnerships (PPP) in deploying shared digital platforms. The adoption of this framework not only assists enterprises in identifying internal capabilities but also contributes to the formation of a regional digital capacity map, laying the groundwork for digital economic development and integrated regional value chains in the coming decade.

3. CONCLUSION AND RECOMMENDATIONS

3.1 Conclusions

The research findings indicate that the digital transformation readiness of enterprises in the Mekong Delta has exhibited discernible improvements in recent years; however, a substantial gap persists relative to other key economic regions in Vietnam. The digital transition in this area is profoundly influenced by the characteristics of an agro-based economy, the predominance of small and medium-sized enterprises (SMEs), and constraints regarding technical infrastructure, workforce quality, and accessibility to technological investment capital. Localities such as Can Tho are emerging as leading hubs for digital application, whereas many other provinces remain in the nascent stages, clearly reflecting an intra-regional digital divide.

Four primary clusters of factors were identified as having a significant impact on the digital capacity of enterprises: (1) technical infrastructure and network connectivity, (2) human resources and digital proficiency, (3) support policies and accessibility to technological capital, and (4) awareness, culture, and digital leadership capacity. Enterprises that adopt long-term investment strategies, possess innovative leadership mindsets, and demonstrate a readiness to integrate technology consistently achieve significantly higher digital proficiency scores than their counterparts. This underscores that digital transformation is not merely a technical challenge but a comprehensive evolution of mindset, governance models, and corporate culture.

Drawing from the experiences of high-readiness nations and localities, this study proposes three strategic orientations for enterprises and authorities in the Mekong Delta. First, it is imperative to strengthen regional coordination mechanisms and data sharing to develop synchronized and interoperable digital infrastructure. Second, digital human resources and technological skills must be cultivated through robust collaboration between enterprises, educational institutions, and local governments. Third, a regional-specific digital transformation evaluation framework should be implemented to assist firms in self-assessing their readiness and optimizing investment directions. The synchronized execution of these solutions will establish a solid foundation for the digital economic development of the Mekong Delta, thereby enhancing competitiveness and facilitating deeper integration into global value chains in the forthcoming period.

3.2 Recommendations

3.2.1 For local authorities

Local governments within the Mekong Delta must identify digital transformation as a pivotal task in socio-economic development for the 2025 - 2030 period. First, it is essential to refine inter-regional coordination mechanisms for Mekong Delta and establish a shared data platform serving enterprises, citizens, and regulatory bodies. Priority investment should be directed toward developing synchronized digital infrastructure, including

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high-speed internet, regional data centers, and e-governance platforms. Furthermore, localities should promulgate financial incentive policies and support packages for SMEs to adopt emerging technologies, coupled with streamlining procedures for accessing innovation funds. Local authorities must also intensify communication efforts to raise societal awareness regarding the role of digital transformation in sustainable development, fostering consensus across the business community.

3.2.2 For enterprises

Enterprises must perceive digital transformation not merely as a technological solution but as a long-term strategic imperative and a vital factor for competitive survival. It is necessary to formulate comprehensive digital transformation plans that include readiness assessments, prioritized roadmaps, and optimal resource allocation. Specifically, firms should aim to invest at least 3 - 5% of their annual revenue into digital infrastructure and solutions, while emphasizing digital upskilling for personnel and cultivating an internal culture of innovation. Large-scale enterprises in the region should act as "innovation hubs," supporting smaller firms through shared platforms, expertise, and digital supply chain integration. Additionally, strengthening collaborations with consultancies, research institutes, and international partners will enable faster access to cutting-edge trends and technologies.

3.2.3 For educational and research institutions

Universities, colleges, and research institutes in the Mekong Delta must modernize their curricula to align with corporate realities and digital market demands. There is an urgent need to promote interdisciplinary programs focusing on digital transformation, artificial intelligence, data analytics, e-commerce, and digital management. Moreover, educational institutions should establish collaborative networks with the private sector to facilitate internships, applied research, and participation in specific local digital transformation projects. The formation of Regional Digital Innovation Hubs (DIH) will enhance the nexus between academia, industry, and the state, thereby bolstering local innovation capacity and technology transfer.

3.2.4 For international organizations and development partners

International organizations, development agencies, and bilateral partners should intensify technical, financial, and professional support for the Mekong Delta's digital agenda. Focus should be placed on SME support programs, digital literacy for the rural workforce, and the development of eco-friendly digital infrastructure. Simultaneously, it is crucial to promote Public-Private Partnership (PPP) models in deploying digitalization projects, data sharing, and agricultural e-commerce. Organizations such as the World Bank, ADB, UNDP, JICA, and USAID can play a centralized role in policy advocacy, technology transfer, and international knowledge sharing, helping the Mekong Delta bridge the digital divide with Vietnam's more advanced economic regions.

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