

Digital Workforce Development for Sustainable Human Resource Management in Vietnam

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Abstract

Digital transformation is reshaping labour markets, organizational practices and human resource management in emerging economies. In this context, digital workforce development has become an important condition for sustainable human resource management, as organizations increasingly require employees with digital skills, adaptability and continuous learning capacity. This study examines the role of digital workforce development in promoting sustainable HRM in Vietnam. Drawing on Human Capital Theory and the Resource-Based View, the study argues that digital skills, lifelong learning and workforce adaptability constitute strategic human resources that support employability, organizational resilience and sustainable competitiveness. Using a qualitative approach based on document analysis and secondary data synthesis, the study reviews global trends in digital workforce development and analyzes Vietnam's key challenges, including digital skill shortages, uneven workforce quality, limited reskilling opportunities, weak lifelong learning mechanisms and mismatches between education and labour market needs. The findings suggest that Vietnam's sustainable digital transformation depends not only on technology adoption but also on systematic investment in workforce capability. The study contributes to the literature by integrating digital workforce development and sustainable HRM in the context of an emerging economy, while offering policy implications for government agencies, enterprises and educational institutions.

Keywords: digital workforce development; sustainable HRM; digital skills; workforce adaptability; Vietnam.

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I. Introduction

Digital transformation is reshaping labour markets, organizational operations and human resource management practices by altering job structures, skill requirements and employment relations. The diffusion of artificial intelligence, automation, big data and digital platforms has intensified the demand for digital skills, adaptability and continuous learning. The World Economic Forum (2023) indicates that technological change will substantially transform workers' core skills, while the OECD (2023) emphasizes that digital skill readiness is essential for labour market resilience. In this context, digital workforce development has become a strategic concern of sustainable human resource management rather than a purely technological issue. Sustainable HRM emphasizes long-term employability, employee wellbeing, workforce resilience and organizational sustainability (Kramar, 2014). Accordingly, investment in digital skills, reskilling, upskilling and lifelong learning can help reduce skill obsolescence, enhance workforce adaptability and support sustainable organizational competitiveness.

Vietnam is a relevant context for examining this relationship. The country has accelerated national digital transformation through the National Digital Transformation Program to 2025, with orientation toward 2030 (Prime Minister of Vietnam, 2020), while its digital economy has expanded rapidly in e-commerce, fintech and digital services (Google, Temasek, & Bain & Company, 2023; World Bank, 2024). However, digital workforce development has not fully kept pace with labour market demands. Key challenges include shortages of digital skills, uneven workforce quality, limited reskilling opportunities, weak lifelong learning mechanisms and mismatches between education and enterprise needs (Ministry of Information and Communications of Vietnam, 2024). Although prior studies have examined digital transformation, digital skills and sustainable HRM, these topics have largely been discussed separately. Limited attention has been paid to how digital workforce capability contributes to employability, workforce resilience and sustainable HRM outcomes in emerging economies such as Vietnam. This gap is significant because Vietnam's digital transformation is shaped by specific conditions,

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including a large share of small and medium-sized enterprises, regional disparities in training access and an education system still adapting to digital labour market requirements.

Drawing on Human Capital Theory and the Resource-Based View, this study analyzes the role of digital workforce development in promoting sustainable HRM in Vietnam. It argues that digital skills, continuous learning capability and adaptability constitute strategic human resources that can enhance employability, organizational resilience and sustainable competitiveness (Becker, 1993; Barney, 1991). The study contributes to the literature by integrating digital workforce development and sustainable HRM in the context of an emerging economy, while offering policy and managerial implications for building a sustainable digital workforce in Vietnam.

II. Literature Review, Theoretical Foundation, and Research Methodology

2.1. Digital Transformation and Workforce Changes

Digital transformation refers to the integration of digital technologies into organizational processes, business models and management practices to enhance efficiency, innovation and competitiveness. In the labour market, technologies such as artificial intelligence, automation, big data, cloud computing and digital platforms have altered job structures, work arrangements and skill requirements. These changes have made workforce development a central concern of HRM, as organizations are required to redesign recruitment, training, performance management, competency development and talent retention practices in response to new forms of work. The World Economic Forum (2023) suggests that technological change will both create new jobs and displace existing ones, leading to significant workforce restructuring. Similarly, the OECD (2023) emphasizes that digital skill readiness is essential for labour market resilience, while the ILO (2022) highlights continuous learning as a key condition for maintaining employability. These global trends should be treated as contextual references rather than directly generalized to Vietnam, where digital readiness remains uneven across sectors, regions and types of enterprises.

A clearer distinction among digital-related capabilities is necessary for analyzing workforce development in the digital era. Digital literacy refers to the basic ability to use digital tools and information safely and effectively, whereas digital skills involve more specialized competencies, such as data analytics, cybersecurity, software use, AI-related skills and digital communication. Digital workforce capability is broader, as it combines digital skills with learning agility, adaptability, collaboration and the capacity to work effectively in digitally mediated environments. This distinction is important because sustainable workforce development depends not only on technical skills but also on the ability to transform individual competencies into collective organizational capability.

2.2. Digital Workforce Development and Sustainable HRM

Digital workforce development can be understood as organizational and institutional efforts to improve employees' digital literacy, specialized digital skills, adaptability and lifelong learning capacity. In the context of sustainable HRM, this process should not be limited to short-term productivity improvement. Sustainable HRM focuses on long-term employability, employee wellbeing, workforce resilience and sustainable organizational development (Kramar, 2014). Therefore, developing a digitally capable workforce is closely linked to the broader objective of sustaining both employee development and organizational competitiveness. From a capability-based perspective, investment in digital training, reskilling, upskilling and lifelong learning strengthens employees' digital capability, which in turn enhances adaptability and employability. These outcomes help reduce skill obsolescence, support workforce resilience and improve organizational capacity for innovation and flexibility.

Previous studies have shown that digital competencies and continuous learning are increasingly important in dynamic business environments. Van Laar et al. (2020) emphasize the role of digital and twenty-first-century skills among working professionals, while Sousa and Rocha (2019) argue that disruptive digital business contexts require continuous capability development. Nevertheless, prior research has often examined digital transformation, digital skills and sustainable HRM as separate streams of inquiry. Limited attention has been paid to how digital workforce capability contributes to employability, workforce resilience and sustainable HRM outcomes in emerging economies such as Vietnam. This study therefore adopts the following analytical logic: digital workforce development enhances digital workforce capability, which strengthens adaptability and employability, thereby supporting workforce resilience and sustainable HRM outcomes.

2.3. Theoretical Foundation

This study is grounded in Human Capital Theory and the Resource-Based View, which provide complementary explanations for the role of digital workforce development in sustainable HRM. Human Capital Theory argues that employees' knowledge, skills, competencies and experience are forms of capital that contribute to productivity and organizational performance (Becker, 1993). From this perspective, investment in digital skills, reskilling, upskilling and lifelong learning can improve employee productivity, reduce skill obsolescence and

strengthen long-term employability. In the digital era, human capital should therefore be understood not only as technical expertise but also as adaptability, learning capacity and the ability to respond to changing work requirements.

The Resource-Based View explains how workforce capability may become a source of sustainable competitive advantage. Barney (1991) argues that strategic resources should be valuable, rare, inimitable and non-substitutable. Basic digital literacy may be necessary for employees, but it is not sufficient to create sustained advantage because it can be widely acquired and easily replicated. By contrast, a workforce that combines digital skills with learning agility, problem-solving capacity, innovation orientation and organizational adaptability may represent a more strategic resource. Such capability is valuable because it supports performance and innovation, rare when embedded in organizational routines, difficult to imitate when reinforced by culture and learning systems, and less substitutable when linked to firm-specific knowledge.

By integrating Human Capital Theory and RBV, the study explains digital workforce development at both individual and organizational levels. At the individual level, digital skills and lifelong learning enhance employability and adaptability. At the organizational level, accumulated workforce capability strengthens resilience, innovation and sustainable competitiveness. To enrich this explanation, Dynamic Capabilities Theory may also be incorporated because it clarifies how organizations sense technological change, seize opportunities and reconfigure human resources in response to digital disruption (Teece, Pisano, & Shuen, 1997).

2.4. Research Methodology

This study adopts a qualitative approach based on document analysis and secondary data synthesis. The analysis draws on academic literature related to digital transformation, digital skills, sustainable HRM, human capital and strategic resources. It also uses reports and policy documents from international and national sources, including the World Economic Forum, OECD, ILO, World Bank, Google, Temasek and Bain & Company, the Ministry of Information and Communications of Vietnam, and Decision No. 749/QĐ-TTg on the National Digital Transformation Program.

The data are analyzed through thematic synthesis, focusing on global workforce changes, digital skill requirements, digital workforce development, sustainable HRM outcomes, Vietnam's workforce challenges and international policy experiences. International reports are used to identify broader labour market trends, while Vietnam-related reports and policy documents are used to contextualize these trends in the national setting. Since the study relies mainly on secondary data, its findings should be interpreted as conceptual and policy-oriented rather than as empirical evidence of causal relationships. Future research may extend this study through enterprise surveys, expert interviews or quantitative analysis of the relationship between digital workforce capability and sustainable HRM outcomes in Vietnamese organizations.

III. Findings and Discussion

3.1. Global Trends in Digital Workforce Development

Global evidence indicates that digital transformation is reshaping workforce structures, skill requirements and HRM priorities across both developed and emerging economies. The diffusion of artificial intelligence, automation, cloud computing and digital platforms has accelerated the decline of routine-based tasks while increasing demand for knowledge-intensive and technology-oriented occupations. The World Economic Forum (2023) estimates that a substantial share of workers' core skills will change in the coming years and that reskilling and upskilling will become increasingly necessary. This suggests that workforce development has shifted from a traditional training function to a strategic requirement for organizational adaptability and sustainability.

Three major trends are particularly relevant. First, automation increases the need for reskilling among workers whose tasks are vulnerable to technological substitution. Second, the expansion of AI, data analytics and cybersecurity raises demand for analytical thinking, technological literacy and problem-solving capabilities. Third, the spread of remote, hybrid and platform-based work requires stronger digital communication, self-learning and performance management capabilities. The OECD (2023) similarly emphasizes that countries with stronger digital skill readiness and lifelong learning systems are more likely to maintain labour market resilience under technological disruption. The ILO (2022) also highlights continuous learning as a key condition for sustaining employability in changing work environments.

For Vietnam, these global trends should not be treated as direct evidence but as analytical reference points. They imply that digital workforce development must go beyond training a limited group of technology specialists. It should also include broader digital literacy for general workers, advanced digital skills for technology-intensive occupations, and adaptive capabilities for employees working in digitally mediated environments. This is particularly important for sustainable HRM because workforce sustainability depends not only on productivity improvement but also on employability, resilience and equitable access to learning opportunities.

3.2. Digital Workforce Development in Vietnam

Vietnam has experienced rapid digital economic growth, driven by the expansion of e-commerce, fintech, digital services and information technology industries. The National Digital Transformation Program emphasizes digital infrastructure, digital government, digital economy and digital human resource development (Prime Minister of Vietnam, 2020). The e-Conomy SEA report estimated that Vietnam's digital economy reached approximately USD 30 billion in gross merchandise value in 2023, indicating its growing position in the regional digital economy (Google, Temasek, & Bain & Company, 2023). The World Bank (2024) also highlights Vietnam's digital development potential, supported by internet penetration, platform adoption and technological diffusion. Despite these positive conditions, digital workforce development has not fully kept pace with labour market transformation. A major challenge is the shortage of workers with advanced digital competencies, particularly in artificial intelligence, cybersecurity, cloud computing, software engineering and data analytics. Reports from the Ministry of Information and Communications of Vietnam (2024) indicate increasing pressure on the supply of digital technology workers. This issue, however, should be analyzed more specifically because digital skill shortages vary across occupational groups. Vietnam does not only need high-skilled technology professionals but also IT technicians, data-related workers and general employees equipped with basic digital literacy. Such differentiation is important for designing workforce policies that match actual labour market needs.

Another challenge concerns uneven digital readiness across regions, sectors and enterprise types. Workers in large cities and technology-intensive industries tend to have better access to digital infrastructure, training opportunities and digital work environments than those in rural areas, traditional sectors or smaller firms. This disparity may intensify skill polarization and limit equal access to employability-enhancing opportunities. From a sustainable HRM perspective, digital workforce development should therefore support not only organizational competitiveness but also inclusive and long-term workforce participation. The limited capacity of many Vietnamese enterprises, especially SMEs, further constrains systematic workforce development. While large firms may have greater resources for digital training and talent development, SMEs often prioritize short-term operational needs due to financial, technological and managerial constraints. As a result, employee training remains fragmented and reactive rather than being embedded in long-term HRM strategies. This weakens organizational resilience and reduces the role of HRM in supporting sustainable digital transformation. The education-labour market mismatch is another significant issue. Although universities and vocational institutions have introduced more digital-related programs, employers increasingly require practical digital skills, interdisciplinary knowledge, problem-solving ability and adaptability. Curricula that remain heavily theory-oriented may be insufficient for preparing workers for rapidly changing digital occupations. Stronger collaboration among government agencies, enterprises, universities and vocational training institutions is therefore necessary to align training outcomes with market demand.

Vietnam's young labour force, expanding technology sectors and increasing digital adoption provide favourable conditions for digital workforce development. These advantages, however, will generate sustainable HRM outcomes only if workforce policies are designed systematically and inclusively. Further analysis should differentiate workforce challenges by industry, region, enterprise size and worker group, with particular attention to SMEs, platform workers and employees vulnerable to automation.

3.3. Comparative Analysis: Vietnam and Selected Economies

Comparing Vietnam with Singapore, South Korea and selected OECD economies provides useful insights, but such comparison should be understood as a conditional reference rather than a direct model for replication. These economies generally have more advanced digital workforce systems, reflected in clearer national skills strategies, stronger lifelong learning mechanisms, closer university-industry collaboration and more systematic reskilling programs. Singapore, for example, has promoted continuous learning through national skill development initiatives, while South Korea has invested substantially in digital training, AI education and workforce transition programs. In many OECD economies, digital workforce development is also supported by institutionalized training finance, labour market information systems and mechanisms for measuring skill demand (OECD, 2023).

Vietnam differs from these economies in several important respects. Its digital workforce development is shaped by more limited training infrastructure, uneven regional access to digital education, weaker lifelong learning mechanisms and resource constraints among enterprises, especially SMEs. In addition, the structure of Vietnam's labour market, the capacity of vocational education and the level of enterprise investment in training remain different from those of more advanced digital economies. Therefore, international experience should be adapted to Vietnam's institutional conditions, financial capacity, enterprise structure and education system rather than transferred mechanically.

Table 1. Comparative criteria for digital workforce development

Comparative criteria	Singapore, South Korea and selected OECD economies	Implications for Vietnam
National digital skills strategy	More coherent national strategies linking digital skills, innovation and labour market competitiveness	Develop a national digital skills framework aligned with Vietnam’s enterprise structure, especially SMEs and vocational education
Lifelong learning system	More institutionalized lifelong learning systems and continuous training pathways	Expand reskilling, upskilling, short courses and micro-credentials for both employed and displaced workers
Training finance	Stronger public-private financing mechanisms for workforce training	Introduce training funds, learning vouchers or tax incentives for enterprises investing in digital skills
University-industry collaboration	Closer collaboration between educational institutions and enterprises in curriculum design and work-based learning	Strengthen enterprise participation in curriculum development, internships and applied digital training
Support for SMEs	More targeted support programs helping SMEs adopt technology and develop workforce capability	Provide low-cost digital training platforms, consulting support and sector-based training programs for SMEs
Labour market information system	More developed systems for forecasting skill demand and monitoring labour market changes	Build digital labour market data by industry, region, occupation and skill level to support evidence-based policy
Skill measurement	More systematic assessment of digital competencies and training outcomes	Establish indicators to measure digital literacy, specialized digital skills and workforce adaptability

Source: Authors’ compilation.

The comparison suggests that Vietnam should prioritize a more coordinated digital workforce development framework. Key areas include a national digital skills strategy, a lifelong learning system, stronger cooperation between educational institutions and enterprises, targeted support for SMEs, sustainable financing mechanisms for reskilling and upskilling, and improved labour market data on digital skills. Such priorities would help Vietnam move from fragmented training efforts toward a more systematic approach to workforce capability development. This is essential because sustainable digital transformation depends not only on technological infrastructure but also on the continuous development of human capital, employability and workforce adaptability.

IV. Implications for Sustainable HRM and Policy Directions

Digital workforce development should be positioned as a strategic component of sustainable HRM in Vietnam rather than as a short-term response to technological change. Its significance lies not only in improving productivity but also in strengthening employability, workforce resilience, employee wellbeing and inclusive workforce participation. Reskilling, upskilling and lifelong learning help employees update digital skills, adapt to changing job requirements and reduce the risk of skill obsolescence. At the organizational level, a digitally capable workforce supports flexibility, innovation and continuity in the face of digital disruption. From a sustainable HRM perspective, workforce development should therefore be integrated into long-term HRM strategies, rather than treated as a separate training activity.

For policymakers, the priority is to develop a national digital skills framework that distinguishes basic digital literacy, specialized digital skills and broader digital workforce capability. This framework should be linked with labour market forecasting, sectoral skill standards and national reskilling programs. In line with Vietnam’s National Digital Transformation Program, policy efforts should move beyond digital infrastructure development and place greater emphasis on human capital development (Prime Minister of Vietnam, 2020). Practical measures may include public training funds, learning vouchers, tax incentives for firms investing in digital skills, and targeted support for workers vulnerable to automation.

For enterprises, digital workforce development should be embedded in strategic HRM practices. Large firms need to assess employees’ digital capability, identify skill gaps, design reskilling and upskilling pathways, and connect training with career development. Continuous learning should also be integrated into performance management, talent development and innovation practices. A learning-oriented culture is necessary to encourage knowledge sharing, experimentation and adaptation to new technologies.

For SMEs, policy support should be more practical and cost-sensitive. Many SMEs face financial, technological and managerial constraints that limit their capacity to invest in systematic workforce development. Government agencies, industry associations and training providers should therefore develop low-cost digital learning platforms, sector-based training programs, shared consulting services and short modular courses. These measures would help SMEs improve digital capability without creating excessive financial burdens.

Educational institutions, including universities and vocational training providers, should redesign curricula to better reflect digital labour market requirements. Training programs need to combine technical knowledge with practical digital skills, problem-solving, interdisciplinary learning and work-based experience. Stronger collaboration with enterprises is necessary to update curricula, organize internships, develop applied projects and

provide short-term certificates or micro-credentials for both students and employed workers. This would help reduce the mismatch between educational outcomes and enterprise needs.

Workers should also be recognized as active participants in digital workforce development. Sustainable HRM requires employees to strengthen self-learning capacity, digital communication, information security awareness and adaptability. However, individual responsibility should be supported by accessible learning opportunities, financial assistance and career guidance, especially for lower-skilled workers, platform workers and employees at risk of technological displacement.

Several implementation risks need to be considered. Digital workforce policies may widen inequality if training opportunities are concentrated mainly in urban areas, large enterprises or technology-intensive sectors. Financial constraints may prevent SMEs from participating in reskilling programs, while universities and vocational institutions may lack qualified instructors, updated curricula and reliable labour market data. Training programs may also become ineffective if they are not linked to actual skill demand. Therefore, policy design should include clear implementation responsibilities, sustainable financing mechanisms, measurable indicators and regular evaluation. These implications suggest that Vietnam's sustainable digital transformation depends on the ability to combine technology adoption with inclusive and measurable workforce development. Digital workforce development should be treated as a long-term HRM and policy agenda that supports employability, resilience, wellbeing and sustainable organizational competitiveness.

V. Conclusion

This study analyzed the role of digital workforce development in promoting sustainable human resource management in Vietnam. The findings suggest that digital skills, continuous learning and workforce adaptability are essential for enhancing employability, organizational resilience and sustainable competitiveness. In Vietnam, rapid digital transformation has created new opportunities for economic and organizational development, but challenges remain, including digital skill shortages, uneven workforce quality, limited reskilling opportunities and mismatches between education and labour market needs. The study contributes to the literature by linking digital workforce capability with sustainable HRM outcomes in the context of an emerging economy. However, as the study relies mainly on secondary data and document analysis, its findings remain conceptual and policy-oriented. Future research should conduct enterprise surveys, expert interviews or quantitative studies to examine how digital workforce capability affects employability, employee wellbeing and sustainable HRM outcomes across different industries in Vietnam.

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