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Factors affecting the development of human resources for digital transformation in state-owned enterprises in Vietnam

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ABSTRACT

This study investigates the key organizational factors that influence the development of digital transformation human resources in Vietnamese state-owned enterprises (SOEs). The research is based on an integrated theoretical framework that combines the Resource-Based View, Human Capital Theory, Adaptive Structuration Theory, and innovation culture perspectives. A six-factor model is proposed, including: (i) policies for developing digital transformation human resources, (ii) HR technology infrastructure, (iii) digital skills training and development, (iv) leadership strategy and commitment, (v) digitalized HR processes, and (vi) innovative corporate culture. Data were collected from 326 respondents, including senior executives, HR managers, and employees from 18 large SOEs in key sectors. The analysis was conducted using Cronbach's alpha, exploratory factor analysis, and multiple regression. The results show that all six factors have a positive effect on digital HR capability. Leadership strategy and commitment have the strongest influence, followed by digital skills training and innovative culture. Digitalized HR processes have the weakest, but still significant, effect. These findings emphasize the importance of strong leadership and continuous capability development for successful digital transformation in SOEs. They also indicate that simply automating HR activities without improving organizational processes and culture may have limited benefits. This study provides empirical evidence from a relatively underexplored context and offers practical policy and managerial implications for supporting digital transformation in state-owned enterprises.

1. Introduction

In the context of the Fourth Industrial Revolution and the digital economy, digital technologies are penetrating deeply into all socio-economic sectors, making digital transformation a vital factor for enterprises and nations. Recent studies indicate that the digital economy is gaining increasing attention, and the application of digital technology in business management is becoming inevitable. In Vietnam, the government has identified digital transformation as a top national policy. Resolution No. 749/NQ-CP in 2022 set the goal of becoming a "digital nation, stable and prosperous," striving for 100% of enterprises to be aware of digital transformation by 2025. However, in practice, most Vietnamese enterprises are still slow in implementing digital transformation. According to reports, up to 98% of small and medium-sized enterprises in Vietnam do not fully recognize the role of digital transformation; only 3% have basically completed this process. Evaluative studies have identified major barriers, such as a shortage of high-quality digital workforce (17%), inadequate information technology (IT) infrastructure (16.7%), and a limited digital mindset and culture (15.7%). In particular, a workforce with advanced digital skills remains a "bottleneck" for digital transformation: Vietnam lacks about 90,000 key IT professionals each year to support the development of its digital socio-economic economy.

Digital transformation is becoming pervasive across all industries and fields globally. Digital technologies (such as cloud computing, AI, IoT, etc.) have been quietly infiltrating every stage of production, business, and management, making digital transformation an inevitable trend (Huynh Thi Thu et al., 2025). In this context, digital human resource management (Digital HRM) has emerged as a valuable management tool, offering many benefits

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such as reducing administrative costs, speeding up work processes, streamlining procedures, and improving operational efficiency (Huynh Thi Thu et al., 2025). In Vietnam, the government has issued national digital economy and digital society development strategies through 2025, with orientations to 2030, to promote comprehensive digital transformation. In this context, human resources are considered the key factor for the successful implementation of digital transformation. However, recent research has shown that Vietnamese workers' digital capabilities are still weak, resulting in the generally low readiness of enterprises for digital transformation. This issue is especially pressing in state-owned enterprises (SOEs), where the scale is large, and their guiding role makes developing digital transformation human resources even more critical. To date, although there have been some studies on digital transformation and human resource management (Phạm et al., 2024), in-depth analyses of the factors driving the development of digital transformation human resources in Vietnamese SOEs are still lacking. To fill this gap, this study conducted a survey and analysis of the factors affecting the development of digital transformation human resources in SOEs, with the aim of providing useful policy proposals for corporate planners and business leaders.

2. Literature review

International and domestic research consistently affirms the importance of digital technology and human resources for digital economy development. The digital economy is defined as the widespread integration of digital technologies into all business, government, and social activities. Advanced technologies such as the Internet of Things (IoT), artificial intelligence (AI), cloud computing, Big Data, and 5G are transforming business models and enhancing data-driven decision-making. A study by the United Nations Economic Commission for Europe (UNECE) points out that digital infrastructure (5G networks, data centers, fiber-optic cables) is a strategic foundation for improving productivity and innovation in enterprises within the digital economy.

Many studies have also identified key factors affecting the development of the digital economy and the digital workforce. International reports such as the OECD (2017) emphasized that developing human capital proficient in digital technology use and maintaining stable macroeconomic policies are keys to driving the digital economy.

In Vietnam, although the field is relatively new, some related research has emerged. Official reports and the media have identified key bottlenecks such as a shortage of a high-quality digital workforce, unsynchronized technical infrastructure, and untimely support policies. The research firm Microsoft notes that government participation (e.g., investing in core technologies, financial support), combined with public-private partnerships, can provide a crucial boost to digital transformation. However, academic research providing in-depth analysis in the Vietnamese context remains lacking, especially regarding specific models and hypotheses. The need for research to systematize theory and test hypotheses on the influence of each factor on the development of digital transformation human resources is clear.

The development of digital transformation human resources is a complex process that involves technology, organizational systems, leadership, and human behavior. Therefore, no single theory can fully explain this phenomenon. This study adopts an integrated theoretical framework that combines several complementary perspectives to explain how different organizational factors influence digital workforce development.

First, the Resource-Based View (RBV) and Human Capital Theory provide the foundation for understanding internal organizational capabilities. The RBV suggests that firms gain a competitive advantage through valuable, rare, and difficult-to-imitate resources (Barney, 1991). In the context of digital transformation, such resources include digital infrastructure, data systems, and technological capabilities. Human Capital Theory emphasizes that employees' knowledge, skills, and competencies are key assets that improve organizational performance. Recent studies confirm that investment in digital skills and human capital significantly enhances firms' digital transformation performance and innovation capability (Sousa and Rocha, 2019). Together, these theories explain the importance of digital skills training, HR technology infrastructure, and development policies in building digital workforce capability.

Second, the interaction between technology and organizational processes is explained by Adaptive Structuration Theory (AST) and the Technology–Organization–Environment (TOE) framework. AST explains how technology and organizational structures influence each other through human interaction (DeSanctis and Poole, 1994). It highlights how employees use digital technologies in their daily work and how these technologies reshape organizational practices. The TOE framework (Tornatzky and Fleischer, 1990) suggests that technology adoption is influenced by technological readiness, organizational characteristics, and external environmental conditions. These perspectives help explain the role of digitalized HR processes and technological infrastructure in supporting digital transformation.

Third, Transformational Leadership Theory explains the role of leadership in organizational change. Effective leaders create a clear vision, motivate employees, and support innovation. Leadership is defined as the ability to influence and guide individuals toward achieving organizational goals (House et al., 2002). In the context of digital transformation, leadership strategy and commitment are critical for allocating resources, reducing resistance to change, and encouraging employees to

adopt new technologies. Fourth, Embeddedness Theory and Innovation Culture Theory explain the social and cultural aspects of digital transformation. Embeddedness Theory suggests that economic actions are shaped by social relationships, networks, and trust (Granovetter, 1985; Nahapiet and Ghoshal, 1998). These social structures support knowledge sharing and collaboration. Innovation Culture Theory emphasizes that shared values and norms that encourage experimentation, learning, and creativity are essential for innovation. Studies show that digital culture and innovation-oriented environments enhance organizational capabilities and performance (Wang et al., 2023). These theories support the role of innovative corporate culture in encouraging employees to adopt digital technologies and develop new skills.

In addition, Endogenous Growth Theory highlights the importance of human capital, innovation, and knowledge in driving long-term economic growth. This theory supports the argument that continuous investment in digital skills and technological capabilities contributes to sustainable development in the digital economy.

By integrating these perspectives, this study develops a comprehensive framework to explain digital transformation in human resource development. Specifically, RBV and Human Capital Theory explain internal capabilities (policy, infrastructure, and training), AST and TOE explain technology–process interactions (digitalized HR processes), Transformational Leadership Theory explains leadership influence, and Embeddedness and Innovation Culture theories explain the role of organizational culture.

Based on this integrated framework, six key factors are identified: (1) policy for digital transformation workforce development; (2) HR management technology infrastructure; (3) digital skills training and development; (4) leadership strategy and commitment; (5) digitalized HR processes; and (6) innovative corporate culture. These factors are expected to have positive effects on digital transformation human resource development.

The nature of the digital transformation workforce lies in its synthesis of traditional human resources and technology, making it susceptible to numerous influencing factors. This study extends theories of digital transformation and digital human resource management by integrating advanced theoretical frameworks relevant to digital transformation and digital human resource development (e.g., Adaptive Structuration Theory (AST), Embeddedness Theory (ET), Resource-Based View (RBV), Technology-Organization-Environment (TOE)). Based on a comprehensive review of relevant literature, this research focuses on explicating the critical factors impacting the level of digital transformation workforce development in State-Owned Enterprises (SOEs), which include: (1) Policy for digital transformation workforce development; (2) HR management technology infrastructure; (3) Digital skills training and development; (4) Leadership strategy and commitment; (5) Digitalized HR processes; and (6) Innovative corporate culture.

This hypothesis is based on the important role of government policies and guidance. International evidence shows that governments can effectively lead digital transformation by setting clear strategies, investing in infrastructure, and encouraging collaboration between the public and private sectors. For example, the Korean government established innovation centers and provided financial support to innovative firms, which encouraged businesses to adopt new technologies. Similarly, the "Broadband China" initiative demonstrates that a proactive government approach, combined with targeted pilot projects, can accelerate the development of digital infrastructure and improve productivity and innovation.

In Vietnam, government policies such as Decision 749 and Scheme 146 aim to strengthen digital capabilities, highlighting the key role of policy in guiding and mobilizing resources for digital transformation. Therefore, it is expected that policies supporting digital workforce development—such as training programs and incentives for investment in digital technologies—will positively influence the development of digital transformation capabilities within the workforce.

H1: Policy for digital transformation workforce development positively impacts digital transformation workforce development.

HR Management Technology Infrastructure. The Resource-Based View (RBV) posits that digital infrastructure is a strategic asset that determines an enterprise's competitive potential. Studies indicate that a robust IT infrastructure, encompassing high-speed networks, data centers, and digital management platforms, serves as the bedrock for effective deployment of digital transformation solutions.

Conversely, inadequate infrastructure (e.g., slow networks, insecure systems) significantly impedes the digitalization process. In the context of the digital workforce, digital Human Resource Management (HRM) infrastructure (such as ERP HR systems, e-HRM software, and online communication tools) helps automate recruitment, training, and performance management processes, consequently boosting overall labor productivity. Research suggests that improvements in digital infrastructure expand the potential for optimizing production and services while creating new job opportunities for employees. Hence, the hypothesis posits that sufficient investment in HR management IT infrastructure will significantly support the development of the digital transformation workforce capabilities.

H2: HR management technology infrastructure positively impacts digital transformation workforce development.

Digital Skills Training and Development. This represents an application of Human Capital Theory within the digital economy context. A workforce equipped with strong digital skills (including new technology literacy, data analytical capability, and creative skills) will effectively drive the use of new technologies. Advanced digital skills are "indispensable" for adaptability to technological advancements, innovation, and competitiveness. In developing nations, investments in R&D and technological education have been proven to positively impact total factor productivity growth. In Vietnam, large-scale training programs are currently in place to cultivate thousands of digital technology experts for the labor market. The theoretical basis predicts that if the state and enterprises intensify digital skills training and cultivation, the digitalized workforce within enterprises will develop more robustly. In other words, enhancing employees' creative and technical capabilities will increase the organization's capacity for digital technology adoption and innovation, thereby contributing positively to the digital transformation process.

H3: Digital skills training and development positively impact digital transformation workforce development.

Leadership Strategy and Commitment. Transformational Leadership Theory and human resource management studies highlight the pivotal role of senior leadership in organizational change. Credible and visionary leadership inspires significant motivation, encouraging employees to be more engaged and innovative. Authentic leadership fosters employee autonomy, creativity, and engagement, thereby enhancing work efficiency in the digital environment. This implies that when the leadership articulates a clear transformation strategy and commits resources to digital transformation, employees will trust this direction and proactively embrace new technologies. Furthermore, the AST framework suggests that when managers actively participate in the digitalization process, the interaction between technology and organizational structure is optimized, augmenting implementation effectiveness. Therefore, based on the theoretical rationale regarding leadership and personnel strategy, Hypothesis H4 posits that strong leadership commitment will contribute positively to the development of digital transformation workforce capabilities.

H4: Leadership strategy and commitment positively impact digital transformation workforce development.

Digitalized HR Processes. The Digital HRM Systems Theory emphasizes that the automation of HR processes—such as online recruitment, electronic performance evaluation, and employee self-service systems—will enhance overall work efficiency. When an enterprise digitalizes HR processes, repetitive tasks are automated, and HR data is standardized and shared more easily. This corresponds to an acceleration of task processing and optimization of organizational procedures. Research indicates that Electronic HRM (E-HRM) systems reduce bureaucracy and save administrative costs. From an empirical perspective, digitalizing HR processes also facilitates flexible employee interaction with technological systems, allowing them to focus on higher-value tasks. Consequently, the hypothesis posits that enterprises with highly digitalized HR processes will elevate the level of digital transformation workforce development.

H5: Digitalized HR processes positively impact digital transformation workforce development.

Innovative Corporate Culture. Corporate culture is a collective set of values, attitudes, and beliefs that influence employee behavior. A culture that supports innovation and experimentation will accelerate the acceptance of new technologies. Embeddedness Theory and digital transformation studies suggest that a supportive culture of information sharing facilitates transformation. Specifically, when the work environment encourages learning and collaboration, employees feel secure in experimenting with new technologies and sharing knowledge. As a result, the enterprise develops a workforce community that is technologically agile and flexible in creativity. Wang et al. (2023) emphasized that digital transformation culture and organizational innovative spirit function as a system to enhance individual and organizational innovation performance. Thus, Hypothesis H6 predicts that an innovation-oriented corporate culture will promote the development process of the digital transformation workforce capabilities.

H6: Innovative corporate culture positively impacts digital transformation workforce development.

Based on the hypotheses above, the proposed research model will test the influence of each strategic factor on the level of digital transformation workforce development within State-Owned Enterprises. Each hypothesis corresponds to a factor in the research model, represented by arrows indicating positive effects from the independent variables to the dependent variable, which is “digital transformation workforce development.”

In the proposed model, the dependent variable is the level of digital transformation workforce development (Digital HR Capability) within the enterprise. The six independent variables correspond to the six hypotheses (H1–H6) as stated above. Each variable is measured through multiple items on the survey questionnaire, which was developed based on related theoretical and empirical research. Based on the theoretical foundation and hypotheses, it is anticipated that all six factors are: Policy for digital transformation workforce

development; HR management technology infrastructure; Digital skills training and development; Leadership strategy and commitment; Digitalized HR processes; and Innovative corporate culture will directly and positively impact the development of the enterprise's digital transformation workforce capabilities. Based on these hypotheses, the proposed research model is shown in Fig. 1.

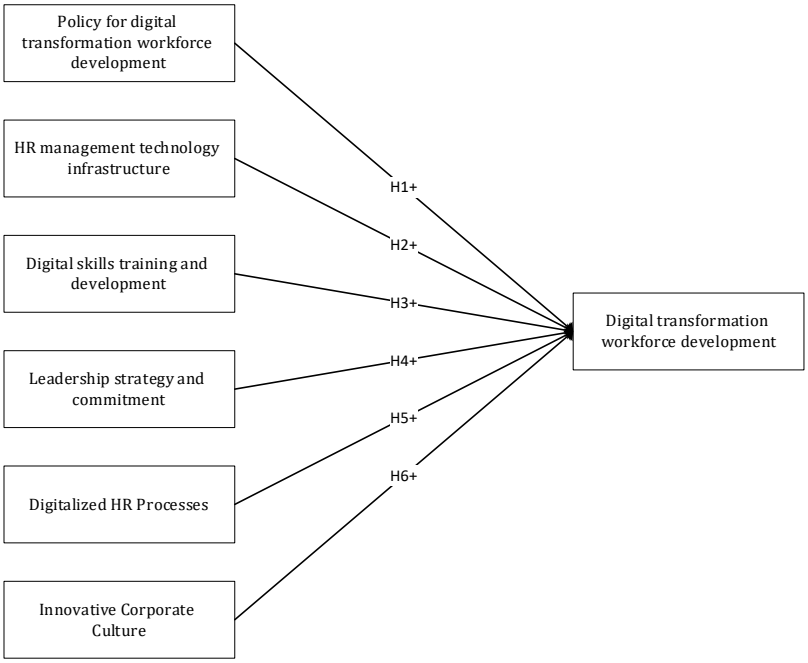

Fig. 1: Proposed research model

The regression equation is formulated as follows:

$$Y(PT) = \beta 0 + \beta 1 \times CS + \beta 2 \times CN + \beta 3 \times DT + \beta 4 \times CL + \beta 5 \times QT + \beta 6 \times VH \quad (1)$$

where, Y is the dependent variable representing Digital Transformation Workforce Development. The independent variables are defined as follows: CS refers to policies for digital transformation workforce development; CN represents HR management technology infrastructure; DT denotes digital skills training and development; CL indicates leadership strategy and commitment; QT refers to digitalized HR processes; and VH represents an innovative corporate culture. The terms β0, β1, β2, …, β6 are the regression coefficients.

3. Research methodology

The measurement scales were adopted and adapted from the study of RSAEC (2018). To ensure the content validity of the instrument, qualitative research was first conducted via semi-structured interviews using purposive sampling. Specifically, the study interviewed two groups of 10 senior leaders in HR development: Group 1 comprised 5 top executives and HR managers from Vietnam Electricity (EVN), and Group 2 comprised 5 top executives and HR managers from the Airports Corporation of Vietnam (ACV). These in-depth interviews elicited feedback on the content and interrelationships of the factors in the proposed model. All interviews were audio-recorded with prior consent, transcribed verbatim and imported into NVivo 11 software for analysis. A three-step thematic coding procedure was applied. First, open coding was used to identify initial codes related to digital HR policies, leadership behaviors, HR technologies, training practices, digitalized processes, and cultural aspects. Second, axial coding clustered these codes into higher-order themes that corresponded to the preliminary construct adapted from the Rosatom framework. Third, selective coding refined the relationships among themes and aligned them with the six proposed factors in our research model.

The qualitative analysis generated several insights that helped tailor the original scales to the Vietnamese SOE context. For example, interviewees repeatedly emphasized the importance of leadership's willingness to reallocate budgets and to model digital behaviors, which led to the inclusion of items on budget prioritization and visible leadership support in the Leadership strategy and commitment scale. Likewise, concerns about legacy systems and fragmented HR software motivated items capturing user satisfaction and system integration in the HR management technology infrastructure construct. These qualitative findings strengthened the content validity of the questionnaire and ensured that the measurement items reflected the language and realities of Vietnamese SOEs.

Based on the refined scales, the researcher developed closed-ended survey questions to provide a solid basis for evaluating the questionnaire's appropriateness. The main study used a 5-point Likert scale (1 = very little influence; 2 = little influence; 3 = neutral; 4 = influence; 5 = strong

influence). The interviews were conducted both in person and online via Zoom from 15 April to 30 April 2025 and were recorded for analysis. The contents of the survey items are presented in Table 1.

According to EFA guidelines, the minimum sample size is 50 and ideally 100 or more. A subject-to-variable ratio of 10:1 or higher is recommended. With 19 measurement items, the minimum required sample size was 190. To allow for potential low response rates, this study targeted a sample of 330. In selecting respondents, the study considered potential differences in leadership strategies and commitment across corporations and their effects on digital HR development. In particular, more senior leaders and HR managers were surveyed from EVN and ACV, which are government-identified flagship entities for digital HR development. Specifically, 5 executives/HR managers were surveyed at EVN and 5 at ACV; each of the remaining corporations provided 2 senior HR managers to ensure objectivity and balance among corporations.

Additionally, a stratified sampling method was used to collect survey responses from SOEs across various sectors (industry, construction, services, logistics, oil & gas) among the 18 targeted corporations. Similarly, for the general manager and staff population, the remaining 288 questionnaires were equally divided among the 18 corporations (16 per corporation) to maintain fairness and balance. Due to travel and meeting constraints, the questionnaires were distributed via email to managers and staff, who responded directly via an online Google Form between May 7 and May 28, 2025.

After data processing, 326 valid responses were obtained (42 from senior executives/HR managers and 284 from middle managers and employees), yielding a response rate of 98.8%. Among the 42 senior executives/HR managers, 75% were male, and 90% were over 35 years old; all had university or postgraduate education. The profile of surveyed managers is representative of Vietnam's SOE sector, with most respondents being older, male, and relatively well-educated.

Among the 284 respondents (managers and staff), the age distribution was concentrated between 25–49 years old: 13.1% were 25–29, 50.9% were 30–39, and 27.2% were 40–49. Most respondents had long tenure: 27.5% had 20–30 years, 49.1% had 10–19 years, and 23.4% had less than 10 years of service. Regarding positions, 15.7% were Directors/Deputy Directors, 34.2% were Department Heads/Deputies, and the remaining 50.1% were department staff. This shows that the study sample was diverse in terms of age, tenure, and job position. The 18 participating SOEs are large economic groups and general corporations under the state ownership function of the Ministry of Finance, operating in strategic sectors such as electricity generation and distribution, civil aviation and airport management, petroleum and energy, construction and infrastructure, logistics and seaport services, telecommunications and information technology, and financial and insurance services. Most of these organisations employ several thousand staff and have nationwide operations. This sectoral diversity increases the external validity of our findings for Vietnamese SOEs engaged in critical infrastructure and public-service provision.

4. Research results and discussion

4.1. Reliability and validity tests

The results of the analysis presented in Table 1 reveal the following. The scale for "Innovative Corporate Culture" exhibited the highest Cronbach's Alpha coefficient at 0.837, while the scale with the lowest Cronbach's Alpha coefficient was "Leadership Strategy and Commitment" at 0.805. Furthermore, all 19 measurement items across the 7 scales met the required thresholds: their respective Cronbach's Alpha coefficients were greater than 0.6, and their item-total correlation coefficients were greater than 0.3. Consequently, the 7 scales are deemed satisfactory and possess sufficient reliability for Exploratory Factor Analysis.

The results of the Exploratory Factor Analysis (EFA) for the 6 independent variables showed a Kaiser-Meyer-Olkin (KMO) value of 0.812 with a significance level of $p = 0.000$ (which is less than 0.05). The corresponding Eigenvalue was 1.312, and the factor loading coefficients for the measurement items were all greater than 0.7, indicating a very strong statistical significance. The cumulative total variance explained was 80.054%. This demonstrates that the 6 independent factors account for 80.054% of the variance among the 18 measurement items included in the EFA.

The EFA for the dependent variable, "Digital Transformation Workforce Development," yielded a KMO value of 0.634 with a significance level of $p = 0.000$ (less than 0.05). The Eigenvalue was 2.573, and the cumulative total variance extracted reached 81.569%. This finding confirms that the factor "Digital Transformation Workforce Development" explains 81.569% of the variance among the measurement items participating in the EFA. Thus, the EFA results demonstrate both discriminant validity and convergent validity, fulfilling the prerequisites for subsequent analyses.

4.2. Regression analysis

The correlation matrix in Table 2 shows that all six independent variables are significantly correlated with the development of digital transformation human resources (PT). The strongest correlation is between "Leadership Strategy and Commitment" (CL) and PT (r = 0.545), and the weakest is between "Digitalised HR Processes" (QT) and PT (r = 0.487). All correlations are significant at the 0.01 level, indicating that the six independent variables qualify for inclusion in the regression analysis to explain the dependent variable (PT).

Table 1: Measurement items and reliability test results (EFA)

Code	Measurement item content	Source	Reliability (Cronbach's α)	Factor loading
	Digital HR development policy (CS)			
CS1	The company has a clear policy for attracting and retaining talent with advanced digital skills.	RSAEC (2018)	0.808	0.897
CS2	The reward and promotion mechanisms for employees leading digital transformation are fair and attractive.			0.883
CS3	Individual digital transformation objectives are integrated as significant weighted factors in my performance evaluation (KPI) system.			0.872
	HR management technology infrastructure (CN)			
CN1	The current HR Management System (HRIS) integrates recruitment, training, and payroll functions on a single platform.	RSAEC (2018)	0.824	0.895
CN2	I can easily access HR services (leave application, information lookup) via a mobile app or remotely.			0.890
CN3	I am satisfied with the speed and user-friendliness of the HR technology tools/systems I use.			0.874
	Training and digital skill development (DT)			
DT1	My colleagues and I have completed digital skill training courses provided by the company in the past year.	RSAEC (2018)	0.817	0.890
DT2	The content of the digital skills training (upskilling/reskilling) is relevant and useful for my actual work in the digital environment.			0.888
DT3	The company encourages and enables me to spend time on self-learning new knowledge via the Online Learning Management System (LMS).			0.870
	Leadership strategy and commitment (CL)			
CL1	The company's digital HR transformation strategy is announced and clearly communicated by leadership at all levels.	RSAEC (2018)	0.805	0.882
CL2	The company prioritizes and allocates sufficient budget for technology projects and digital HR development.			0.878
CL3	Senior leaders regularly participate in and directly support digital HR development activities/projects.			0.867
	Digitalised HR processes (QT)			
QT1	Most core HR processes have been fully automated (end-to-end), minimizing manual intervention.	RSAEC (2018)	0.821	0.877
QT2	Digitization has significantly shortened the processing time of HR transactions (e.g., recruitment, approvals).			0.868
QT3	The company has fully switched to a paperless process (e.g., e-contracts, e-payroll) for HR transactions.			0.861
	Innovative corporate culture (VH)			
VH1	The company encourages employees to experiment with new ways of working and views failures as learning opportunities.	RSAEC (2018)	0.837	0.872
VH2	Digital tools allow me to easily collaborate and share knowledge with colleagues from other departments.			0.864
VH3	The company has mechanisms for employees to contribute digital improvement ideas and takes these ideas seriously.			0.855
	Digital transformation HR development (PT)			
PT	Degree of development of digital transformation human resources.	This study	0.809	0.863

Table 2: Correlation coefficient matrix

Structure	PT	CS	CN	DT	CL	QT	VH
PT	1						
CS	0.523**	1					
CN	0.520**	0.542**	1				
DT	0.511**	0.442**	0.443**	1			
CL	0.545**	0.247**	0.590**	0.449**	1		
QT	0.487**	0.476**	0.421**	0.563**	0.466**	1	
VH	0.543**	0.452**	0.233**	0.214**	0.442**	0.426**	1

**: Linear Correlation at the Confidence Level of 99% (0.01)

Using the Enter method, a regression analysis was conducted with the six independent variables and the dependent variable (PT). The model fit results in Table 3 show that the regression model fits the data well. The adjusted R^2 is 0.541, indicating that the six independent variables explain 54.1% of the variance in digital transformation HR development. Table 3 also shows a Durbin-Watson statistic of 1.942, which lies between 1.5 and 2.5, suggesting no first-order autocorrelation. The ANOVA results in Table 4 show F = 57.895 with Sig. = 0.000 ($p < 0.05$), leading to the conclusion that the overall R^2 is significantly different from zero. Therefore, the regression model is a good fit for the data. The ANOVA in Table 4 demonstrates an F = 57.895 with a significance level (Sig.) for the F = 0.000 (which is less than the threshold alpha = 0.05). This result leads to the conclusion that R^2 of the population is non-zero. Consequently, the regression model is a good fit for research data.

Table 5 presents the detailed regression coefficients. All six independent factors have positive coefficients and are significant ($p < 0.01$) for predicting the development of digital transformation human resources. In particular, "Leadership Strategy and Commitment" has the strongest standardized beta coefficient (β4 = 0.359), followed by "Training and Digital Skill Development" (β3 = 0.336) and "Innovative Corporate Culture" (β6 = 0.321). The factors of "Digital HR Development Policy" (β1 =

0.289) and "HR Technology Infrastructure" (β2 = 0.223) also have positive significant effects, while "Digitalised HR Processes" has the weakest positive effect (β5 = 0.194).

Table 3: Goodness of fit of the linear regression model

Model	R	R^2	Adjusted R^2	Std. error of the estimate	Durbin-Watson
1	0.701a	0.562	0.541	0.33453	1.942

a. Predictors: (Constant), CS, CN, DT, CL, QT, VH

Thus, the hypotheses H1 through H6 are supported at a significance level of 0.000. Additionally, the tolerance statistics are all above 0.607, and the variance inflation factors (VIF) are all below 10, indicating no multicollinearity issues. The standardized beta regression equation is as follows:

$$PT = 0.289CS + 0.223CN + 0.336DT + 0.359CL + 0.194QT + 0.321VH \quad (2)$$

In summary, all six factors – digital HR development policy, HR technology infrastructure, training and digital skill development, leadership strategy and commitment, digital HR processes, and innovative corporate culture – have positive impacts on the development of digital transformation human resources in SOEs. Among them, leadership strategy and commitment have the strongest influence. Therefore, this research can serve as a framework for future studies exploring factors affecting digital transformation HR development in SOEs.

4.3. Discussion

The regression results confirm that all six proposed factors exert a positive and statistically significant influence on the development of digital transformation human resources in Vietnamese SOEs. Among them, Leadership strategy and commitment emerge as the strongest predictors (β = 0.359). This finding is consistent with Transformational Leadership Theory and with recent evidence from Chinese and Vietnamese SOEs, which highlights the central role of top management in legitimizing and driving digital initiatives in highly institutionalized environments. In organizations where senior leaders clearly communicate digital vision, allocate dedicated budgets, and personally sponsor digital HR projects, employees perceive digital transformation as a strategic priority rather than a temporary campaign.

Table 4: ANOVA

Model		Sum of squares	df	Mean square	F	Sig.
1	Regression	52.145	6	9.421	57.895	0.000b
	Residual	37.562	231	0.134		
	Total	89.707	237			

b. Predictors: (Constant), CS, CN, DT, CL, QT, VH

Table 5: Results of regression analysis

Model		Unstandardized regression coefficients		Standardized regression coefficients	t	Sig.	Multicollinearity statistics	
		B	Std. error	Beta			Tolerance	VIF
1	(Constant)	0.407	0.156		3.056	.000		
	CS	0.132	0.031	0.289	2.432	.000	0.672	1.341
	CN	0.104	0.022	0.223	5.729	.000	0.578	1.224
	DT	0.145	0.036	0.336	1.241	.000	0.702	1.087
	CL	0.190	0.021	0.359	2.315	.000	0.751	1.102
	QT	0.231	0.026	0.194	1.056	.000	0.607	1.183
	VH	0.112	0.033	0.321	2.021	.000	0.610	1.671

The second and third strongest effects belong to Training and digital skill development (β = 0.336) and Innovative corporate culture (β = 0.321). Together, these results suggest that technology investment alone is insufficient; organizations must simultaneously invest in people and culture. Extensive upskilling and reskilling programs equip employees with concrete digital competencies, while an innovative-oriented culture provides the psychological safety and encouragement needed to experiment with new tools and work practices. In Vietnamese SOEs, which have traditionally emphasized stability and compliance, such cultural shifts can be challenging but are crucial for unlocking the full potential of digital HRM. These findings reinforce the arguments of Phạm et al. (2024) regarding the centrality of digital skills and supportive cultures for successful digital transformation. The positive but comparatively weaker impact of HR management technology infrastructure (β = 0.223) indicates that having integrated HRIS and user-friendly platforms is an important enabling condition but does not automatically translate into high digital HR capability. This may reflect the reality that many SOEs have invested in HR software but still struggle with system integration, data quality issues or limited user adoption. In some cases, HR technologies are used mainly for administrative automation rather than for advanced analytics or strategic workforce planning.

Interestingly, Digitalized HR processes show the smallest yet still significant effect (β = 0.194). One plausible explanation is that in many SOEs, HR processes have been partially automated without being fundamentally redesigned. Employees may still follow legacy workflows and simply use digital tools as a substitute for paper forms, which limits the transformative impact on skills and behaviors. Another reason may be resistance to change or

insufficient training on new workflows, leading to underutilization of available e-HRM functionalities. Similar patterns have been reported in other digital transformation studies, which find that organizations often digitize existing procedures instead of reengineering them to exploit the full potential of digital technologies.

Overall, the results support the integrated theoretical framework proposed in Section 2. The development of digital transformation human resources in SOEs appears to be a systemic outcome: when leadership commitment, supportive policies, robust HR technologies, intensive training, digitalized processes, and an innovative culture are aligned, the probability of successful digital transformation increases substantially. Conversely, gaps in any of these dimensions can act as bottlenecks that slow down progress. These insights provide a nuanced explanation for the pattern of regression coefficients and offer a solid basis for the managerial implications discussed in the next section.

5. Managerial implications

The findings of this study highlight several strategic and policy-oriented implications that are essential for accelerating digital transformation of human resources (DTHR) in Vietnamese state-owned enterprises (SOEs). First, leadership commitment must move beyond declarations into concrete governance actions. Strong executive direction—through dedicated steering committees, integration of DTHR indicators into strategic planning, and visible leadership modelling—creates institutional legitimacy and mitigates resistance common in hierarchical SOE environments. Without decisive leadership, digital initiatives risk becoming symbolic rather than transformative.

Second, the significant role of digital skills training indicates that SOEs must build a continuous learning ecosystem rather than rely on fragmented training activities. Developing digital competency frameworks, forming partnerships with training institutions, and linking career advancement to digital proficiency can establish long-term human capital foundations. A workforce equipped with adaptable skills is crucial for sustaining digital HR development in rapidly evolving technological contexts.

Third, improvements to HR technology infrastructure should prioritize system integration and user adoption. Although investments in HR technologies exist, their impact remains limited when systems operate in silos or when employees underutilize digital functions. Enhancing interoperability, strengthening data governance, and implementing structured change management programs can convert HR technologies into strategic enablers that support evidence-based HR decisions.

Fourth, the weakest influence—digitalized HR processes—reveals that many SOEs digitize outdated procedures without redesigning them. To unlock real transformation, SOEs must shift from automating existing workflows to reengineering them around digital logic. Simplifying procedures, standardizing processes across units, and embedding performance indicators can generate meaningful operational improvements and strengthen DTHR outcomes.

Finally, cultivating an innovative corporate culture is vital for sustaining progress. Encouraging experimentation, rewarding digital initiatives, and promoting cross-functional collaboration can help employees internalize digital mindsets and reduce organizational conservatism. At the policy level, regulators can reinforce these efforts by issuing national digital competency standards, offering financial incentives for DTHR investments, and establishing sector-wide benchmarks. Coordinated actions between enterprise leadership and state management bodies will create an enabling environment that supports long-term digital HR development in SOEs.

6. Conclusion

This study investigated the organizational determinants of digital transformation human resources (DTHR) within Vietnamese state-owned enterprises (SOEs) and confirmed that leadership commitment, digital skills training, innovative culture, HR technology infrastructure, digitalized HR processes, and supportive policies all contribute positively to digital HR development. The results reinforce the view that DTHR does not emerge from technology adoption alone but from the alignment of strategic leadership, human-capital investment, redesigned processes, and enabling organizational culture. Among these factors, leadership commitment, skills development, and cultural innovation exert the strongest influence, underscoring the importance of vision, capability building, and behavioral change in SOE transformation efforts.

This study contributes to the limited empirical literature on DTHR in transition economies and provides actionable insights for both managers and policymakers. Strengthening digital governance mechanisms, establishing continuous learning systems, improving technological integration, and fostering innovation-oriented cultures can significantly accelerate digital HR development in SOEs. These implications highlight that effective digital transformation requires coordinated action rather than isolated initiatives.

Future research may extend these findings by examining institutional or environmental variables, conducting longitudinal assessments of DTHR evolution, or comparing SOEs with private enterprises to better understand sectoral differences in digital workforce development.

List of abbreviations

ACV	Airports corporation of Vietnam
AI	Artificial intelligence

AST	Adaptive structuration theory
CL	Leadership strategy and commitment
CN	Human resource management technology infrastructure
CS	Policy for digital transformation workforce development
DT	Digital skills training and development
DTHR	Digital transformation human resources
DV	Dependent variable
E-HRM	Electronic human resource management
EFA	Exploratory factor analysis
ERP	Enterprise resource planning
ET	Embeddedness theory
EVN	Vietnam electricity
HR	Human resources
HRIS	Human resource information system
HRM	Human resource management
IoT	Internet of Things
IT	Information technology
KMO	Kaiser–Meyer–Olkin
KPI	Key performance indicator
LMS	Learning management system
PT	Digital transformation human resources development
QT	Digitalized human resource processes
R&D	Research and development
RBV	Resource-based view
RBV-HCT	Resource-based view–human capital theory
SOEs	State-owned enterprises
TOE	Technology–organization–environment
VH	Innovative corporate culture

Compliance with ethical standards

Ethical considerations

Ethical approval was sought and granted for this study. All participants provided informed consent, and their participation was strictly voluntary. Confidentiality and anonymity were strictly maintained throughout the data collection and analysis process, ensuring that no individual respondent could be identified.

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

References

Barney J (1991). Firm resources and sustained competitive advantage. Journal of Management, 17(1): 99-120. https://doi.org/10.1177/014920639101700108

DeSanctis G and Poole MS (1994). Capturing the complexity in advanced technology use: Adaptive structuration theory. Organization Science, 5(2): 121-147. https://doi.org/10.1287/orsc.5.2.121

Granovetter M (1985). Economic action and social structure: The problem of embeddedness. American Journal of Sociology, 91(3): 481-510. https://doi.org/10.1086/228311

House R, Javidan M, Hanges P, and Dorfman P (2002). Understanding cultures and implicit leadership theories across the globe: An introduction to project GLOBE. Journal of World Business, 37(1): 3-10. https://doi.org/10.1016/S1090-9516(01)00069-4

Huynh Thi Thu S, Phạm M, and Luc HN (2025). Leveraging digital human resource management to optimize organizational performance in Vietnam. Humanities and Social Sciences Communications, 12: 802. https://doi.org/10.1057/s41599-025-05113-2

Nahapiet J and Ghoshal S (1998). Social capital, intellectual capital, and the organizational advantage. Academy of Management Review, 23(2): 242-266. https://doi.org/10.2307/259373

OECD (2017). OECD digital economy outlook 2017. OECD Publishing, Paris, France. https://doi.org/10.1787/9789264276284-en

Phạm TTH, Ngoc TTB, Cuong DM, Binh DT, and Si LT (2024). Digital skills of human resources: Exploratory research of innovations in enterprises. HighTech and Innovation Journal, 5(3): 730-742. https://doi.org/10.28991/HIJ-2024-05-03-013

RSAEC (2018). Annual report 2018. Rosatom State Atomic Energy Corporation. Available online at: https://report.rosatom.ru/go_eng/go_rosatom_eng_2018/go_eng_2018.pdf

Sousa MJ and Rocha Á (2019). Skills for disruptive digital business. Journal of Business Research, 94: 257-263. https://doi.org/10.1016/j.jbusres.2017.12.051

Tornatzky LG and Fleischer M (1990). The processes of technological innovation. Lexington Books, Blue Ridge Summit, USA.

Wang Y, Yu Z, Zeng Z, Yang L, Wang C, Chen H, Jiang C, Xie R, Wang J, Xie X, Ye W, Zhang S, and Zhang Y (2023). PandaLM: An automatic evaluation benchmark for LLM instruction tuning optimization. ArXiv Preprint ArXiv:2306.05087. https://doi.org/10.48550/arXiv.2306.05087