Factors influencing the development of digital human resources in digital transformation in Vinh Phuc province, Vietnam

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Abstract: ***This article applies a multivariate regression method to evaluate factors affecting digital human resources in digital transformation activities, using data collected from enterprises, organizations, and individuals in Vinh Phuc province. The study reveals that enhancing human resource capabilities through training and skill development significantly improves the efficiency of digital transformation in Vinh Phuc. The research findings provide a theoretical basis and propose solutions for managers and policymakers to strengthen digital human resources and accelerate the Province's digital transformation in the current context.***

Keywords: *Digital transformation; digital human resources; influencing factors; Vinh Phuc province.*

1. Introduction

Digital transformation represents a revolutionary process in which digital technology evolves from a mere tool to the foundation of all production, business, and public service activities. Digital human resources play a critical role in the national digital transformation strategy. They are considered a key factor for Vietnam to become a digital nation by 2030, with a highly skilled workforce capable of meeting the demands of a digitized labor market (Ministry of Information and Communications, 2022).

In a digitalized environment, digital human resources need technological knowledge, creativity, adaptability, and collaboration skills. Vinh Phuc province holds significant potential for integrating technology into production and services. In 2021, Vinh Phuc ranked 12th out of 63 provinces and cities in the 2021 digital transformation index with a score of 0.4880, climbing 43 places compared to 2020 (Ministry of Information and Communications, 2020).

However, the competency and qualifications of the province's information technology (IT)

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personnel still need to be improved, which poses a bottleneck to achieving successful digital transformation. Statistics show that among 57 provincial and district-level agencies, 35 have specialized IT staff, accounting for 61%, while 22 lack dedicated IT personnel, making up 39%. Across the province, there are 106 specialized IT staff members (14 with master's degrees and 92 with bachelor's degrees). Fewer than 80% have professional qualifications that meet IT standards, while over 20% have related or non-IT qualifications but are assigned IT tasks (Minh, 2024).

Therefore, this paper analyzes the factors influencing the development of digital human resources in Vinh Phuc's digital transformation efforts, aiming to propose solutions to improve the quality of the province's workforce.

2. Theoretical basis

According to the World Economic Forum (2020), digital transformation plays a crucial role in generating new value through the application of technology. Organizations can improve productivity and enhance customer outreach and service quality by leveraging digital infrastructure and training employees in technological skills. Digital transformation helps minimize risks and increases predictability in business operations through data analysis and predictive modeling.

Digital human resources are generally defined as individuals capable of effectively using information and communication technology (ICT) to complete tasks in a digitalized environment. According to Westerman et al. (2014), digital human resources are not limited to technological skills but also require creativity, flexible thinking, and the ability to work in constantly changing environments. Digital skills encompass proficiency in using technological tools and problem-solving and information management capabilities in cyberspace.

McKinsey Global Institute (2020) highlights that digital human resources must quickly adapt to emerging technologies such as artificial intelligence (AI), the Internet of Things (IoT), and big data (Big Data). This adaptability enables them to perform their roles effectively, lead innovation, and optimize workflows, thus improving organizational productivity and efficiency. Moreover, digital skills include soft skills such as communication, collaboration, and leadership, which are essential in diverse team environments.

Digital human resources are critical to all aspects of digital transformation. They are vital in executing work processes and driving innovation and creativity (Sandra & Shalene, 2018). Their roles can be categorized into three primary levels: process optimization, creation of new products and services, and fostering a digital organizational culture.

Digital transformation requires technological proficiency and a high level of continuous learning and development. Digital human resources must be trained to meet job requirements and prepare for future changes. McKinsey (2020) recommends that organizations develop a comprehensive skill development plan to enhance employee competencies, ensuring sustainable outcomes in digital transformation.

In Vietnam's National Digital Transformation Strategy, the Government emphasizes that developing digital human resources is the foundation of building a digital economy and society. The Government has also directed increased investment in digital education and skill training across various fields to improve the quality of the workforce and Vietnam's competitiveness in the global market. However, some regions, including Vinh Phuc province, face significant challenges, such as IT workforce shortages and limited technical infrastructure. Training and developing digital human resources have become an urgent priority in the current period to accelerate digital transformation in Vinh Phuc.

3. Research methodology

The study employs a mixed-method approach, combining quantitative and qualitative methods with a 5-point Likert scale to evaluate the factors influencing the development of digital human resources in Vinh Phuc's digital transformation.

After consulting experts on the appropriate sample size to ensure comprehensive and representative coverage of various groups, the research team selected 135 respondents at three management levels: specialists, mid-level managers, and senior managers. The distribution was 71 specialists, 50 mid-level managers, and four senior managers. The respondents' ages ranged across all categories, with the breakdown as follows:

- Under 25 years old: 1 respondent.
- 25-35 years old: 34 respondents.
- 36-45 years old: 88 respondents.
- 46-50 years old: 8 respondents.
- Over 50 years old: 4 respondents.

Regarding education levels, the majority held bachelor's degrees (94 respondents, 70%), followed by master's degrees (37 respondents, 24.7%), with the remainder having high school, vocational, or college education. Regarding management experience:

- Less than 1 year: 12 respondents.
- 1-5 years: 17 respondents.
- 6-10 years: 38 respondents.
- 11-20 years: 62 respondents.
- Over 20 years: 6 respondents.

A stratified sampling method based on management level, age, and experience was employed, ensuring a comprehensive evaluation of digital human resource factors and avoiding bias from surveying a single group.

The assessment criteria for factors influencing digital human resource development were based on Decision No. 749/QD-TTg, dated June 3, 2020, by the Prime Minister, approving the "National digital transformation program by 2025, with orientations toward 2030." The research identified 13 indicators used to measure digital human resources:

(1) The percentage of communes with community digital technology teams over the province's total number of communes.

(2) The percentage of villages and hamlets with community digital technology teams over the province's total number of villages and hamlets.

(3) The Department of Information and Communications assigned functions and responsibilities related to digital transformation.

(4) The Department of Information and Communications' dedicated unit or division for digital transformation.

(5) The percentage of public servants and officials specializing in or concurrently managing digital transformation tasks over the total number of public servants and employees in the unit.

(6) The percentage of public servants and officials specializing in or concurrently managing cybersecurity tasks over the total number of public servants and employees in the unit.

(7) The percentage of public servants and officials receiving training in digital transformation over the total number of public servants and employees in the unit.

(8) The percentage of colleges, universities, and postgraduate institutions offering digital transformation programs over the province's total number of such institutions.

(9) The percentage of graduates in digital transformation from colleges, universities, and postgraduate institutions over the province's total number of graduates.

(10) The percentage of workers receiving training in applying technological and technical skills over the province's total number of workers.

(11) The percentage of citizens receiving basic digital skills training through the OneTouch platform (a mass open online learning platform) over the province's total population.

(12) The percentage of colleges, universities, and vocational training institutions implementing digital transformation (completing digital governance, digital activities, and open digital learning resources) over the total number of such institutions.

(13) The percentage of primary to high school educational institutions implementing digital transformation (completing digital governance, digital activities, data standardization, and open digital learning resources) over the total number of such institutions.

4. Research results

After using Cronbach's Alpha to assess the reliability of the measurement scales for the components in the research model, the research team employed multivariate regression analysis, identifying 13 factors influencing digital human resources in Vinh Phuc's digital transformation. The study underwent three validation steps: Scale Reliability Testing (SRT), Exploratory Factor Analysis (EFA), and Confirmatory Factor Analysis (CFA).

Looking at Table 1, it shows that X4, X6, X7, X9, X10, X12, and X13 have a sig value > 0.05. These factors were excluded, and the model was recalculated, yielding the following results:

Table 1: Regression results evaluating the impact of factors on the "digital human resources" variable

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
	0.285	0.229		1,245	0.216					
X1	0.303	0.072	0.272	4.211	0	0.132	0.358	0.131	0.23	4,338
X2	-0.468	0.102	-0.545	-4.606	0	0.323	-0.386	-0.143	0.069	14,593
X3	0.443	0.062	0.822	7,100	0	0.862	0.542	0.22	0.072	13,949
X4	-0.127	0.072	-0.234	-1.768	0.08	0.831	-0.159	-0.055	0.055	18,303
X5	0.542	0.11	0.558	4,919	0	0.439	0.408	0.152	0.075	13,384
X6	-0.092	0.053	-0.142	-1.725	0.087	0.744	-0.155	-0.053	0.141	7,075
X7	0.017	0.033	0.024	0.521	0.603	0.345	0.047	0.016	0.444	2,252
X8	0.13	0.043	0.146	3,058	0.003	0.565	0.268	0.095	0.422	2,371
X9	0.045	0.055	0.072	0.81	0.42	0.735	0.073	0.025	0.121	8,253
X10	-0.077	0.07	-0.08	-1.097	0.275	0.548	-0.099	-0.034	0.182	5,498
X11	0.147	0.05	0.327	2,921	0.004	0.821	0.257	0.091	0.077	13,016
X12	0.003	0.067	0.003	0.043	0.966	0.786	0.004	0.001	0.173	5,795
X13	0.032	0.045	0.046	0.722	0.472	0.024	0.065	0.022	0.237	4,218

Source: Compiled by the authors, 2024.

Table 2: Regression results evaluating the impact of factors on the "digital human resources" variable after excluding variables

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	0.278	0.196		1,414	0.16					
	X1	0.242	0.056	0.218	4,333	0	0.132	0.358	0.135	0.383	1,018
	X2	-0.346	0.07	-0.403	-4.962	0	0.323	-0.402	-0.154	0.147	1.911
	X3	0.322	0.033	0.597	9,664	0	0.862	0.649	0.301	0.254	1,062
	X5	0.446	0.07	0.46	6,372	0	0.439	0.491	0.198	0.186	1,510
	X8	0.162	0.039	0.181	4.152	0	0.565	0.345	0.129	0.508	0.552
	X11	0.087	0.035	0.194	2,499	0.014	0.821	0.216	0.078	0.16	1,736

Source: Compiled by the authors, 2024.

Looking at Table 2, it can be observed that all variables with sig values < 0.05, indicating statistical significance.

The final regression equation is as follows:

NLS = 0.278 + 0.242X1 - 0.346X2 + 0.322X3 + 0.446X5 + 0.162X8 + 0.087X11

Digital human resources in the province will change depending on the following indicators:

• X1: Percentage of communes with community digital technology teams over the province's total number of communes.

• X2: Percentage of villages and hamlets with community digital technology teams over the province's total number of villages and hamlets.

• X3: The Department of Information and Communications' assigned functions and responsibilities related to digital transformation.

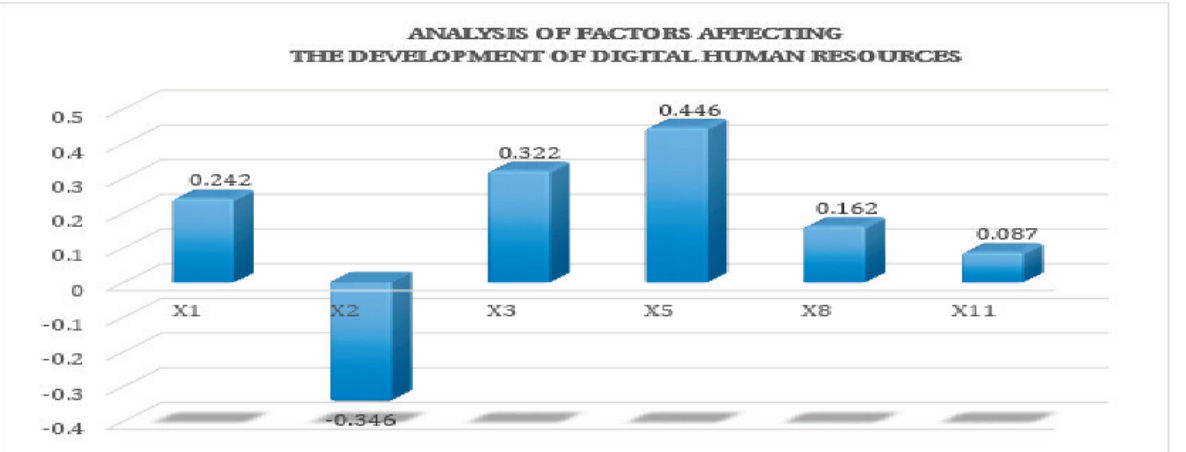
• X5: Percentage of public servants and officials specializing in or concurrently managing digital transformation tasks over the total number of public servants and employees in the unit.

• X8: Percentage of colleges, universities, and postgraduate institutions offering digital transformation programs over the province's total number of such institutions.

• X11: Percentage of citizens receiving basic digital skills training through the OneTouch platform over the province's total population.

The model highlights X3 (functions and responsibilities of the Department of Information and Communications) and X5 (specialized staff in digital transformation) as the most influential factors in developing Vinh Phuc's digital human resources. (Figure 1)

Figure 1: Factors influencing the development of "digital human resources"



Source: Compiled by the authors, 2024.

Model Validation

(1) ANOVA Test:

Table 3 confirms the model's validity with a sig value < 0.05, indicating that at least one independent variable significantly impacts the dependent variable. The model is reliable for evaluating factors influencing digital human resources.

Table 3: ANOVA test for the model evaluating the impact of factors on the "digital human resources" variable

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	32,147	6	5,358	150,956	.000 [b]
	Residual	4,543	128	0.035		
	Total	36,690	134			

Source: Compiled by the authors, 2024.

Table 4: Durbin-Watson test for the model evaluating the impact of factors on the "digital human resources" variable

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.936a	0.876	0.87	0.18839	0.876	150,956	6	128	0	1,416

Source: Compiled by the authors, 2024.

(2) Durbin-Watson Test:

Table 4 reports:

• R Square = 0.876, indicating the model explains 87.6% of the variance in digital human resources.

• Adjusted R Square = 0.870, exceeding 0.5, confirming the model's adequacy.

• Durbin-Watson = 1.416, within the acceptable range of 1 to 3, confirming no autocorrelation in the residuals.

3. Multicollinearity Test:

Variance Inflation Factor (VIF) values for all variables are < 10, confirming no multicollinearity issues in the model.

5. Conclusion and recommendations

Firstly, considering digital human resources as a core factor in digital economic and social development

Digital human resources are pivotal to developing a digital economy and society. Plans that encourage officials, public servants, and workers across sectors to enhance their digital skills are essential. This will enable them to proficiently use digital applications for operational tasks, management, and effective production-business activities.

Secondly, fostering high-quality human resource development

Developing human resources, especially high-quality personnel, is crucial to meeting the demands of the Fourth Industrial Revolution and international integration. This requires focusing on cultivating leading experts and scientists in technology and building a skilled workforce in technical fields, digital technology, technology management, and enterprise governance. Recruitment, utilization, and retention policies for talent in public administration, science and technology, and innovation must be reformed to address these needs effectively.

Thirdly, encouraging enterprises to embrace digital transformation

Enterprises should be encouraged to adopt digital transformation in production and business activities. When businesses integrate digital technologies, they impose new demands on workers' digital skills. To secure employment and stable income, workers must adapt by proactively learning, improving their skills, and mastering the application of science and technology. This, in turn, fosters a digital workforce capable of meeting the requirements of a digital economy and society.

To achieve these goals, Vinh Phuc province must act as an intermediary, connecting enterprises and public organizations with educational institutions and research centers to forecast, plan, and implement training programs to develop digital human resources aligned with practical needs. Establishing digital learning resources and digital libraries will enhance self-learning capabilities and facilitate access to knowledge and information for learners.

References:

1. Ministry of Information and Communications. (2020). *Announcement of digital transformation rankings for ministries and provinces in 2020.*

2. Ministry of Information and Communications. (2022). *Statistical data.* Retrieved October 20, 2024 from https://mic.gov.vn/so-lieu-thong-ke.htm.

3. Ministry of Information and Communications. (2022). *Decision No. 922/QĐ-BTTTT dated May 20, 2022, approving the project "Determining the set of indicators for evaluating digital transformation for ministries, ministerial-level agencies, governmental agencies, provinces, and central cities, and for the nation."*

4. Prime Minister. (2020). *Decision No. 749/QD-TTg dated June 3, 2020, approving the "National digital transformation program by 2025, with orientations toward 2030".*

5. Minh, L. (2024). *Digital transformation and the workforce challenge.* Retrieved from https://baovinhphuc.com.vn/vi-vn/Tin-t%E1%BB%A9c/ID/109449/Chuyen-doi-so-va-bai-toan-nhan-luc.

6. McKinsey Global Institute. (2020). *Report on essential skills for the future.*

7. Sandra J. S., & Shalene, G. (2018). *Layoffs That Don't Break Your Company: Better Approaches to Workforce Transition.* Harvard Business Review, 96(3), 122–129.

8. World Economic Forum. (2020). *The Role of digital transformation in the global economy.*

9. Westerman, Bonnet, & McAfee. (2014). *Leading digital: Turning technology into business transformation.*

Further reading:

1. Thuy, N. T. T. (2023). *Public governance in the context of digital transformation in Vietnam: opportunities, challenges, and solutions.* Journal of State Management. Volume 30, No 9, October 2023.

2. Thuy, P. T. (2023). *Developing digital human resources in the context of digital transformation in Vietnam.* Retrieved from https://www.quanlynhanuoc.vn/2023/08/04/phat-trien-nguon-nhan-luc-so-trong-chuyen-doi-so-o-viet-nam-hien-nay/