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Digital Transformation and Developing Digital Capacity in Vietnam

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Abstract

The Fourth Industrial Revolution (Industry 4.0), with its explosive development of digital technology, is changing the methods of state governance. Therefore, digital transformation is an inevitable trend to shift the model of state governance from a physical environment to a digital environment, building a digital government to better serve the people. This also places demands on the digital capabilities of entities participating in state governance processes, including civil servants and citizens. This study analyzes the characteristics, objectives of digital transformation, and the requirements for digital capabilities for civil servants and citizens. The theoretical model is designed to analyze the impact of the independent variables "Civil servants' digital capacity" (CSC) and "Citizens' digital capacity" (CDC) on the dependent variable "Digital transformation" (DT). The author surveyed 300 local government leaders at the commune level to conduct an empirical assessment of the digital capabilities of civil servants and citizens, drawing scientific conclusions about the extent to which it impacts digital transformation goals. This assessment then suggests policy issues aimed at developing digital human resources in Vietnam today.

Keywords: Digital transformation; Digital capacity; Digital government; Vietnam.

1. Introduction

Vietnam is asserting its position as a rapidly adapting technology nation in Southeast Asia, aiming for the digital technology sector to contribute approximately 15% of GDP by 2024 and 20% by 2030; and by 2030, to become a nation with advanced scientific, technological, and innovation capabilities in many important fields, ranking among the top 3 countries in Southeast Asia, the top 50 countries in the world in digital competitiveness and e-government development index, and the top 3 countries in Southeast Asia in artificial intelligence research and development (CPV, 2024).

In fact, over the past decade, the Fourth Industrial Revolution has had a widespread impact, digital technology has developed rapidly, and the trend of digital transformation in state administration and organizational management has emerged. In this context, Vietnam has proactively developed a national digital transformation program (PM, 2020), marking a shift in thinking, management methods, and the application of digital technology with the goal of developing a digital government to build a clean, modern, professional, effective, and efficient administration that better serves the people.

The digital transformation landscape in Vietnam presents many new challenges, including digital infrastructure, digital workforce, and digital technology, which require research and experimentation; attracting the attention of many experts, researchers, and managers. Within the scope of this study, excluding digital infrastructure and

digital technology, the author identifies the central focus for analysis as the key actors in digital transformation for building a digital government – the digital capabilities of civil servants and the digital capabilities of citizens.

2. Literature review

According to the current popular understanding, digital transformation is the process of comprehensive and holistic change for individuals and organizations in their way of life, work, and production methods based on digital technologies such as the Internet of Things, artificial intelligence, cloud computing, and big data. This is not just about digitizing data, but about changing mindsets, business models, and culture to create new value, increase operational efficiency, and enhance customer experience. According to Nghia, L.T. (2021), digital transformation is the process of comprehensive and holistic change for individuals and organizations in their way of life, work, and production methods based on digital technologies. Sharing this view, but with a more concise explanation, Hung, D.V. (2022) states that digital transformation is the transformation of operating models based on digital technology and digital data.

In public administration, digital transformation, with the application of digital technology, creates new value, namely a new organizational and operational model oriented towards integrating technology and exploiting big data in digitized form, enabling government agencies to best perform their tasks of managing social development. Many studies have shown that digital transformation truly brings many benefits and is genuinely significant for public administration and social development management in each country. MIC (2021) and Tuyen, H.T.M. (2023) explain that this benefit is reflected in the organizational structure, management, operation, and provision of public services; helping to save time and costs for both government agencies and citizens, and forming a model of digital government and digital society. In the aspect of local-level public administration, the scale "Digital transformation" (DT) is constructed to imply the following main contents: Local authorities carry out state administration tasks (making laws, policies, providing public services, etc.) in a digital environment (DT1); A digital culture in state administration is formed, allowing citizens to easily participate in the management and provision of public services at the local level (DT2); A digital society is formed and developed, allowing interaction between the government and citizens to be carried out more frequently and easily through online means (DT3).

The essence of digital transformation is the application of digital technology to change the method of state governance from a physical environment to a digital environment, serving as the foundation for building and developing a digital government. Therefore, in addition to digital infrastructure and digital technology, the subject factor (digital workforce) plays a decisive role in achieving the goals of digital transformation (Chen, L. et al., 2024). In other words, the subjects participating in digital transformation, including civil servants and citizens, must meet the basic digital competency requirements necessary to interact and perform tasks and transactions in the digital environment. Many recent studies analyzing and interpreting the digital competency of civil servants and citizens imply the digital knowledge and skills they are trained and updated to form the capacity to work and transact in the digital environment.

- Firstly, the digital capacity of civil servants is essential for them to perform state administration tasks in the context of digital transformation. According to Tuyen, H.T.M. (2023), to achieve the goal of digital transformation, civil servants must be trained and equipped with digital skills to work and interact in the digital environment regularly; thereby forming a habit of working and interacting in the digital environment in each civil servant; and also forming a digital culture in the public service activities of civil servants. Similarly, Khanh, T.T.B. (2025) explains that civil servants are the subjects implementing digital transformation in state administration to develop a digital government; they must be trained and equipped with basic and necessary digital knowledge and skills. At the same time, civil servants must proactively and regularly self-improve and update their digital knowledge and skills to successfully complete assigned tasks in the digital environment: advising and organizing the implementation of assigned tasks in the digital environment; Directing, managing, inspecting, supervising, and reporting on the results of assigned tasks in the digital environment… The scale "Civil servants' digital capacity" (CSC) is broadly defined to include the following contents: Civil servants use digital technology proficiently, safely, and securely to realize their work and provide advice in the digital environment (CSC1); Civil

servants use digital technology proficiently, safely, and securely to organize and carry out tasks and public duties in the digital environment (CSC2); Civil servants interact with and guide citizens in handling digital information and data proficiently, safely, and securely to effectively perform their assigned tasks and public duties (CSC3).

- Secondly, the digital capacity of citizens is essential for their participation in local government processes in the digital environment. According to MIC (2021) and JOSM (2022), to achieve the goal of digital transformation, citizens need to be educated and provided with basic digital knowledge and skills to transact in the digital environment when participating in social activities and in the process of state administration. Accordingly, the necessary digital capacities of citizens include the ability to access digital information sources; the ability to communicate in the digital environment; basic digital skills; online shopping; ethical standards in the digital environment; protection of physical and psychological well-being from the influences of the digital environment; rights and responsibilities in the digital environment; identification and authentication of personal data; privacy rights in the digital environment… The scale "Citizens' digital capacity" (CDC) is broadly defined to reflect the following contents: Citizens are educated and provided with basic digital knowledge and skills to conduct transactions in the digital environment when participating in state administration processes (CDC1); Citizens are proficient in online transactions when registering for public services and requesting the resolution of administrative documents at the local level (CDC2); Citizens are proficient in online transactions when participating in policy processes at the local level (CDC3).

When digital transformation is widely implemented, and civil servants and citizens possess digital knowledge and skills and are proficient in transactions in the digital environment, then a digital society will be formed and operate synchronously. State governance in the digital environment will be facilitated by digitized big data, saving resources while ensuring effectiveness. At that time, interaction between government agencies and citizens will be carried out more frequently and easily through online means; digital transformation will affirm its role, have truly great significance, and be an inevitable development trend. With that in mind, this study conducts empirical research with the hypothesis: Developing civil servants' digital capacity *(H1), Developing citizens' digital capacity (H2) are fundamental requirements that directly impact the goal of digital transformation in public administration, aiming to develop a digital government in Vietnam*.

Thus, through a comprehensive review, the author develops a theoretical framework on digital transformation by evaluating the impact of "Civil servants' digital capacity" (CSC) and "Citizens' digital capacity" (CDC) [two scales/independent variables] on "Digital transformation" (DT) [one scale/dependent variable]. The scales consist of nine observed variables, designed by the author as nine questions in a survey questionnaire and measured using a 5-point Likert scale: 1 - Strongly disagree; 2 - Disagree; 3 - Neutral; 4 - Agree; 5 - Strongly agree (Table 1, Figure 1).

Table 1. Theoretical framework

No	Scales	Encode	Rating levels				
			1	2	3	4	5
I	**Civil servants' digital capacity**	**CSC**					
1	Civil servants use digital technology proficiently, safely, and securely to realize their work and provide advice in the digital environment	CSC1					
2	Civil servants use digital technology proficiently, safely, and securely to organize and carry out tasks and public duties in the digital environment	CSC2					
3	Civil servants interact with and guide citizens in handling digital information and data proficiently, safely, and securely to effectively perform their assigned tasks and public duties	CSC3					

No	Scales	Encode	Rating levels				
			1	2	3	4	5
II	**Citizens' digital capacity**	**CDC**					
4	Citizens are educated and provided with basic digital knowledge and skills to conduct transactions in the digital environment when participating in state administration processes	CDC1					
5	Citizens are proficient in online transactions when registering for public services and requesting the resolution of administrative documents at the local level	CDC2					
6	Citizens are proficient in online transactions when participating in policy processes at the local level	CDC3					
III	**Digital transformation**	**DT**					
7	Local authorities carry out state administration tasks (making laws, policies, providing public services, etc.) in a digital environment	DT1					
8	A digital culture in state administration is formed, allowing citizens to easily participate in the management and provision of public services at the local level	DT2					
9	A digital society is formed and developed, allowing interaction between the government and citizens to be carried out more frequently and easily through online means	DT3					

Source: Compiled by the author through the review

Research model

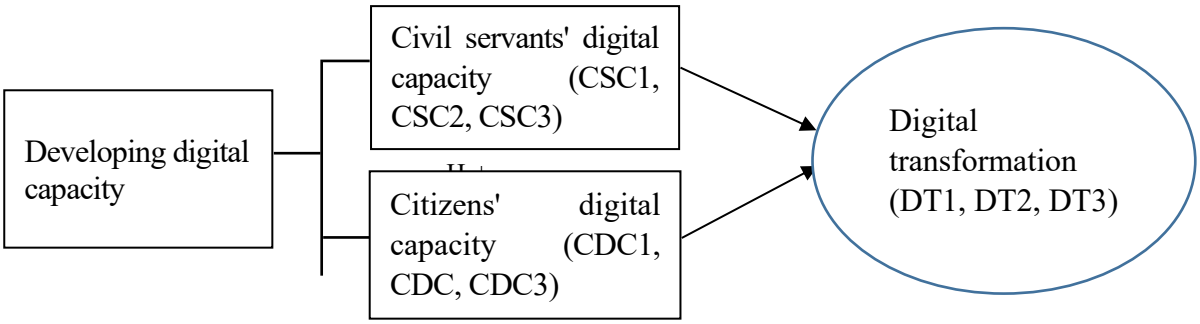

Figure 1. Research model

3. Research methods

This study uses a combination of qualitative and quantitative methods. Qualitative research is employed in the process of collecting and analyzing secondary data to build a theoretical framework. Quantitative research is used in the process of collecting and analyzing primary data using survey tools to test the theoretical model and research hypotheses. The author conducts the survey in two steps: a preliminary survey and a formal survey.

- Preliminary Survey: The author used exploratory factor analysis and regression analysis to test the theoretical model and research hypotheses. According to Hair, J.F. et al. (2009), the minimum sample size required for

exploratory factor analysis and regression analysis for the 3-scale, 9-observed variable model of this study is: N = 9*5 = 45. First, the author conducted a preliminary survey with a sample size of N = 100 (N > 45) of commune-level leaders in Hung Yen province. The preliminary survey results showed that the scales and observed variables all had sufficient reliability to be used in a larger-scale formal survey.

- Formal Survey: The author conducted a formal survey with a sample size of N = 300 commune-level leaders from 3 provinces representing the 3 regions of Vietnam, including Hung Yen province (Northern Vietnam), Quang Ngai province (Central Vietnam), and Ca Mau province (Southern Vietnam). The survey was conducted based on preliminary interviews and the consent of the respondents. The results showed that 300 out of 300 responses were valid, achieving a 100% response rate.

4. Research results and discussion

First, the authors tested the reliability of the scales and observed variables in the research model to serve as a basis for conducting further analyses. In quantitative research, according to Hair, J.F. et al. (2009), scales and observed variables have reliability when they meet the standard conditions: Cronbach's alpha > 0.6; Corrected Item-Total Correlation > 0.3. Table 2 shows that the test results for all 3 scales and 9 observed variables show reliability when meeting the above standard conditions.

Table 2. Statistical results and testing results of the scale

Scales	Observed variables	N	Min	Max	Mean	Std. Deviation	Cronbach' Alpha	Corrected Item-Total Correlation
1. Civil servants' digital capacity (CSC)	CSC1	300	1	5	4.11	.703		CSC1 = .613
	CSC2	300	1	5	4.15	.689	.718	CSC2 = .606
	CSC3	300	1	5	4.07	.724		CSC3 = .549
2. Citizens' digital capacity (CDC)	CDC1	300	1	5	4.04	.684		CDC1 = .552
	CDC2	300	1	5	3.98	.657	.674	CDC2 = .438
	CDC3	300	1	5	4.01	.633		CDC3 = .503
3. Digital transformation (DT)	DT1	300	1	5	4.10	.692		DT1 = .674
	DT2	300	1	5	4.13	.703	.701	DT2 = .584
	DT3	300	1	5	4.08	.679		DT3 = .506
Valid N (listwise)		300						

Source: Author's survey results

Survey data (Table 2) shows that observations of the scales "Civil servants' digital capacity" (CSC), "Citizens' digital capacity" (CDC), and "Digital transformation" (DT) are all rated at a mean of ≥ 3.98, which is statistically significant according to the Likert scale (1-5). This contributes to confirming that digital transformation in state administration in Vietnam is being carried out synchronously by localities, and a digital culture in state administration is being formed, allowing interaction between the government and citizens to be carried out more frequently and easily through online forms. At the same time, the entities implementing digital transformation (civil servants, citizens) possess the basic digital knowledge and skills necessary to achieve the digital transformation goals: Civil servants use digital technology proficiently, safely, and securely to realize their ideas, advise on and organize the implementation of tasks and public services in the digital environment, guide citizens in processing digital information and data effectively, and complete assigned tasks and public services; Citizens conduct online transactions proficiently when registering for public services, requesting the resolution of administrative documents, and participating in local policy processes.

However, there is a discrepancy in the observed values of the scales. Accordingly, the "Citizens' digital capacity" (CDC) scale has the lowest average observed values: Mean (CDC1) = 4.04, Mean (CDC2) = 3.98, Mean (CDC3) = 4.01. This

indicates that although citizens have been educated and provided with basic digital knowledge and skills for online transactions when participating in state administration processes, many still lack proficiency in online transactions when registering for public services, requesting administrative document processing, or participating in local policy processes. In reality, the goal of digital transformation is to serve the people and meet their needs quickly and accurately. Therefore, in addition to civil servants being proficient in digital skills, citizens also need to be proficient in digital skills when participating in local state administration processes; only then will the goal of digital transformation be achieved. This reality directly impacts the effectiveness of government operations, therefore, developing digital knowledge and skills for citizens needs to be implemented more regularly and promptly, aiming to build a digital government and a civilized digital society.

With the test results meeting the standards, all three scales and nine observed variables in the model were used for further analysis. The author conducted exploratory factor analysis with Varimax rotation to preliminarily assess the unidimensionality, convergent validity, and discriminant validity of the scales and to test the fit of the theoretical model.

Table 3. Total Variance Explained

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.740
Bartlett's Test of Sphericity	Approx. Chi-Square	2928.492
	df	36
	Sig.	.000

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.439	38.208	38.208	3.439	38.208	38.208	3.045	33.829	33.829
2	2.998	33.311	71.518	2.998	33.311	71.518	2.850	31.669	65.499
3	1.092	12.130	83.648	1.092	12.130	83.648	1.633	18.150	83.648
4	.510	5.666	89.314						
5	.493	5.473	94.787						
6	.174	1.929	96.716						
7	.148	1.643	98.359						
8	.104	1.158	99.517						
9	.044	.483	100.000						

Extraction Method: Principal Component Analysis.

Source: Author's survey results

Table 4. Rotated Component Matrix

Rotated Component Matrix[a]

Scales	Observed variables	Component		
		1	2	3
1. Civil servants' digital capacity (CSC)	CSC1	.866		
	CSC2	.795		
	CSC3	.831		
2. Citizens' digital capacity (CDC)	CDC1		.843	
	CDC2		.815	
	CDC3		.794	
3. Digital transformation (DT)	DT1			.867
	DT2			.871
	DT3			.822
Extraction Method: Principal Component Analysis.				
Rotation Method: Varimax with Kaiser Normalization.				
a. Rotation converged in 4 iterations.				

Source: Author's survey results

Survey data shows: KMO = 0.740 > 0.5, confirming that exploratory factor analysis is appropriate for the dataset; Bartlett's test has an observed significance level Sig. = 0.000 < 0.05, indicating that the observed variables are linearly correlated with the representative factor; Total Variance Explained with Cumulative % = 83.648% > 50%, showing that 83.648% of the variation in the representative factors is explained by the observed variables (Table 3). All observed variables have Factor Loading > 0.5 (Table 4), indicating that the observed variables are statistically significant.

Initial Eigenvalues stop at 3 factors with Eigenvalues > 1 (Table 3), indicating that the observed variables were extracted into 3 factors corresponding to the 3 original factors. Thus, the original research model is preserved and is scientifically appropriate; confirming the suitability of the theoretical research model on digital government, digital competence of civil servants, and digital competence of citizens, with 3 scales and 9 observed variables as constructed.

Based on the exploratory factor analysis results above, all three scales and nine observed variables have good reliability and statistical significance. Further multivariate regression analysis will be conducted to examine the relationships between the scales in the research model: two independent scales/variables, "Civil servants' digital capacity" (CSC) and "Citizens' digital capacity" (CDC), and one dependent scale/variable, "Digital transformation" (DT).

Table 5. Multivariate regression results

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	VIF
		B	Std. Error	Beta			
1	(Constant)	1.025	.229		10.319	.000	

	1. Civil servants' digital capacity (CSC)	.532	.364	.512	9.466	.000	1.894
	2. Citizens' digital capacity (CDC)	.416	.329	.401	8.334	.000	1.875
a. Dependent Variable: Digital transformation (DT)							
R^2 = 0.718; Durbin-Watson = 2.007							

Source: Author's survey results

Table 5 data shows:

+ R^2 = 0.718 confirms that the "Civil servants' digital capacity" (CSC) and "Citizens' digital capacity" (CDC) scales explain 71.8% of the variation in the "Digital transformation" (DT) scale; VIF = 1.894 and VIF = 1.875 (1 < VIF < 2) indicate that the regression model does not exhibit multicollinearity; Durbin-Watson = 2.007 (1 < d < 3) indicates that the regression model does not exhibit autocorrelation, confirming that the "Civil servants' digital capacity" (CSC) and "Citizens' digital capacity" (CDC) scales are independent and influence each other on the "Digital transformation" (DT) scale, thus confirming the suitability of the theoretical research model to the survey dataset.

+ The regression coefficients of the two independent variables "Civil servants' digital capacity" (CSC) and "Citizens' digital capacity" (CDC) are both statistically significant (Sig. = 0.000, Sig. < 0.05) and positive: B(CSC) = 0.532 and B(CDC) = 0.416, confirming a positive correlation between the two independent variables "Civil servants' digital capacity" (CSC), "Citizens' digital capacity" (CDC) and the dependent variable "Digital transformation" (DT); hypotheses H1 and H2 are accepted; and the initial research model's suitability is further confirmed.

Based on the general regression model Y = Bo + B1*X1 + B2*X2 + … + Bi*Xi + e (Hair, J.F. et al., 2009), the multivariate regression model of this study is determined as: DT = 1.025 + 0.532*CSC + 0.416*CDC; the correlation levels of the independent and dependent variables in decreasing order are: "Civil servants' digital capacity" (CSC), "Citizens' digital capacity" (CDC).

With the results of the regression analysis (Table 5) and the statistical analysis (Table 2), this study further confirms the empirical results in Vietnam, that:

- Firstly, digital transformation in state administration in Vietnam is being carried out synchronously by localities, forming a digital culture in state administration, allowing interaction between the government and citizens to be carried out more frequently and easily through online forms; civil servants and citizens have the basic digital knowledge and skills necessary to achieve the goal of digital transformation.

- Secondly, although citizens have been educated and provided with basic digital knowledge and skills for conducting transactions in the digital environment when participating in state administration processes, many still lack proficiency in online transactions when registering for public services, requesting the processing of administrative documents, or participating in local policy processes.

From the conclusions of this empirical research, the author suggests solutions for developing people's digital capacity to meet the requirements of digital transformation in Vietnam: (1) Localities actively organize communication about digital transformation, support people in learning, updating, and supplementing basic digital knowledge and skills to adapt to the trend of digital transformation and the development of a digital society; (2) In the long term, localities need to proactively develop digital human resources to achieve the goals of digital transformation and the development of a digital society by researching and implementing a program to popularize digital knowledge and skills, making it a standard education and training content applied appropriately to each level of education.

Thus, digital transformation is a collective effort, requiring active participation from both the government and the people. For citizens, as beneficiaries of policies and customers served according to the goals of digital transformation, they need to access information, be equipped with and update their digital knowledge and skills

to become active participants in the digital society. Therefore, developing the digital capacity of citizens is significant both in the short and long term for localities in Vietnam.

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