

Developing Digital Literacy for Vietnamese Civil Servants

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Abstract

Different political, economic, cultural and social conditions will lead countries to their own ways, methods and roadmaps to successfully implement their national digital transformation goals. However, there is one factor that always plays a prerequisite role in digital transformation: the human factor - digital literacy. In the public sector, it is the civil servants' digital literacy, an essential factor, enables civil servants to achieve the goal of digital transformation, perform public duties in the digital environment and modernize the public administration. In this study, the theoretical framework on digital literacy has been built up, including: (1) Capacity to use digital technology, (2) Capacity to exploit digital information and data, (3) Capacity to create digital content, (4) Capacity to perform digital transactions, assess the impact of digital literacy on civil servants' public duty performance in the digital environment. A survey was conducted to collect opinions of 360 commune-level civil servants in 3 provinces representing 3 regions of Vietnam, including: Thai Binh province (Northern region), Quang Nam province (Central region), Tay Ninh province (Northern region), Quang Nam province (Central region), Tay Ninh province (Southern region). The results show that the commune - level civil servants self-assess themselves at a low level in terms of proficiency in all four aforementioned digital capacities, posing requirements for the development and implementation of training policies on digital literacy for civil servants in Vietnam today. These findings suggest related issues as recommendations for developing and improving policies on Vietnamese civil servants' digital literacy.

Keywords: *Civil servants, Digital literacy, Digital civil servants, Vietnam.*

Introduction

Vietnamese public servants in localities are permanent staff working in 63 provincial-level administrative units (provinces and municipal cities), 705 district-level administrative units (districts in provinces and cities, towns, provincial cities, cities of municipal cities), 10,599 commune-level administrative units (communes, wards, commune - level towns) [GSO, 2024]. In terms to develop civil servants with qualities, capabilities, and qualifications to meet the requirements of serving the people, digital literacy has been addressed in Vietnam's policies in recent years so that the goals of national digital transformation could be achieved [PM, 2020]. Based on characteristics of public service, job positions and the needs of civil servants, training policies are annually implemented by central and local government agencies as planned to develop digital literacy and digital human resources – digital civil servants for public duty performance.

According to the general assessment of the Ministry of Home Affairs (the government agency responsible for managing civil servants in Vietnam), the annual training policies for civil servants, implemented by central and local government agencies, have achieved significant results. This contributes to improving civil servants' qualities and capacities; enable them to meet rank standards and job position standards; develop digital civil servants to successfully implement the goals of the national digital transformation. However, the quality of civil servants hasn't been sufficient enough to meet the requirements of digital transformation and modernization of the administrative system. Training policies have not been effectively implemented in localities; civil servants have not proactively studied to update and supplement digital knowledge and digital skills, leading to the low digital literacy, affecting the quality of performing professional tasks and the efficiency of public service activities [MOHA, 2023].

These limitations pose a need for innovation in management policies that central and local government agencies should pay attention to so that civil servants' the digital literacy could be improved. Therefore, researches on digital literacy of civil servants is necessary, confirming the significance of this study as well

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as providing scientific arguments and evidence for planning and implementation of policies by Vietnamese government agencies.

Literature Review

Digital literacy is a new concept, increasingly popular and important in the development trend of a digital society. This is also a new requirement for human resources in both the public and private sectors. Overall, digital literacy represents an individual or organization's capacities to understand, utilize information and digital technology to meet their needs and goals. To an individual, digital literacy refers to his capacities to equip necessary knowledge and skills for his life, study and work in a digital society. To an organization, it is necessary to look beyond individuals' capacities and consider the extent to which an organization's culture and infrastructure can support and promote digital activities for general development of the organization.

There have been recent studies confirming that digital literacy includes not only cognitive and behavioral aspects but also changes and creativity in cognition and behaviors of receiving and application of digital technology to develop digital skills during an individual's working process. According to VJST (2021), an individual's digital literacy is a prerequisite for him to become a digital citizen. In other words, a digital citizen is a person with digital literacy which enables him to create, work, share, socialize, explore, play, communicate and learn on the digital platform. This person also actively and responsibly participates in all fields of politics, economics, society, culture ... of the community in the digital environment. Similarly, Hung, D.V. et al. (2021) affirm that "digital literacy is the combination of computer use capacity, information technology capacity, and communication capacity". Basing on results from the theoretical and practical researches, VJST (2021) and Hung, D.V. et al. (2021) develop a digital competence framework consisting of 7 capacities - 7 requirements, which are: Capacity to operate equipment and software; Capacity to exploit information and data; Capacity to communicate and collaborate in a digital environment; Capacity to ensure digital safety and security; Capacity to create digital content; Capacity to learn and develop digital skills; Capacity to apply digital literacy to work.

Sharing the same view, Nga, Q. (2023) further explains "digital literacy does not simply refers to skills but actually a mindset of modern people in the modern era". This author specifically states that digital literacy helps people optimize time, create better opportunities for career, discover and maximize their potential, provide knowledge and capacities to defend themselves against risks in digital space. Therefore, the importance of digital literacy should be addressed on so that individuals put more efforts into learning to improve their digital literacy, apply digital skills in daily – life activities, openly communicate on social networks and always follow the trends of modern technology. Or, digital literacy "is not simply about digital knowledge and skills, but also includes capacities to analyze information, evaluate situations and apply knowledge to make wise decisions" [PACE, 2023].

In a comprehensive study, the United Nations Educational, Scientific and Cultural Organization (UNESCO) defines "digital competence as the capacities to access, manage, understand, combine, communicate, evaluate and create information safely and appropriately through digital technology to serve the general labor market, senior - level jobs and startups" [Hoang, N.H., 2022]. At the same time, UNESCO has launched a international digital competence framework to support their member countries in dealing with challenges of the digital revolution. The digital competence framework is used for different purposes such as: assessing digital skills of individuals, organizations and society, developing education and training programs, and researching digital literacy. UNESCO's digital competence framework includes 6 main points: (1) Capacity to use technology - operate equipment and software: Identify, select, and utilize hardware and software tools to identify and analyze digital information in the problem solving process; (2) Capacity to find information - access, evaluate, use, and share information and data effectively; (3) Capacity to analyze information - solve problems: Understand and operate specific digital technologies related to each specific working field; (4) Capacity to create and share content - Create and share digital content creatively; master relevant policies and licenses, and create commands for computer systems; (5) Capacity to use technology safely and securely - Protect yourself and others from risks in the digital environment; (6) Capacity to use technology to collaborate and communicate with others - Support individuals in interacting and

collaborating through digital technology; be aware of cultural diversity and actively manage personal identity [UNESCO, 2018].

Within the regional range, the study on digital literacy by the Council of Europe's (2013) [from PACE, 2023] suggests “a reference model that describes the skills and competencies needed to use digital technology effectively and responsibly in the context of learning, working and social participation”. Accordingly, the digital literacy that a citizen must have includes: (1) Information capacity - The capacity to access, evaluate, use and share information and data effectively with 3 necessary competencies: Browse, search and filter information; evaluate information; store information and retrieval; (2) Capacity to communicate and collaborate – The capacity to communicate, share information in a digital environment, link and collaborate through digital tools, interact and participate in the community and networks, be aware of cultural interference with 5 essential competencies: Interact through technologies; share information and content; play the role of digital citizen; collaborate through digital channels; adhere to netiquette; manage digital identity; (3) Capacity to create digital content – The capacity to create and edit new content from word processing to images and videos; integrate and edit previous knowledge and content, and resolve and apply intellectual property rights and licenses in the digital environment with 4 necessary competencies: develop digital content; integrate and edit existing content and knowledge; understand how to apply copyrights and licenses to programming information and content; (4) Capacity to use technology safely - Protecting individuals and their family members in the digital environment, protect data and digital identity, security measures, and safely and sustainably use tools in the digital environment with 4 necessary competencies: provide protection; protect personal data; protect health; protect digital environmental; (5) Capacity to analyze information and solve problems: Identify needs and digital resources and make wise decisions about choosing suitable digital tools suitable to serve purposes and intended needs, solve problems through digital means, adjust the capacities of the individuals themselves and others with 4 necessary competencies: Solve technical problems; Identify needs and respond to technology; innovate and be creative in using technology; identify gaps in digital capacities.

These studies define digital literacy in a broad sense, representing a general competence framework for organizations and citizens, not for any specific target groups. Specifically, this study focuses on discussing about digital literacy of civil servants - human resources in the public sector, based on the findings from the preceding studies, mainly from those by UNESCO (2018), Council of Europe (2013), VJST (2021) and Hung, D.V. et al. (2021). It can be seen that these studies have certain differences in arranging issues related to digital literacy: (1) VJST (2021) and Hung, D.V. et al. (2021) come up with 7 key points of digital competency: Capacity to operate equipment and software; capacity to exploit information and data; capacity to communicate and collaborate in a digital environment; capacity to ensure digital safety and security; capacity to create digital content; capacity to learn and develop digital skills; capacity to apply digital competencies to jobs; (2) Council of Europe (2013) presents 5 key points of digital literacy: Capacity to provide information; capacity to communicate and cooperate; capacity to create digital content; capacity to use technology safely; capacity to analyze information and solve problems; (3) UNESCO (2018) discusses about 6 issues of digital literacy: Capacity to use technology; capacity to search for information; capacity to analyze information; capacity to create and share content; capacity to use technology safely and securely; capacity to use technology to collaborate and communicate with others. These digital competences are all necessary for civil servants. In other words, civil servants need to have basic knowledge and skills about digital technology to work and interact in the digital environment effectively, safely and securely.

The synthesis of researches on digital literacy and the characteristics of public duty performance of civil servants (performing professional tasks, political tasks associated with advisory responsibilities to develop and implement policies and laws; interact and transact with the people to resolve their requests in accordance with citizen's rights, etc.) are considered and categorized into 4 elements that constitute civil servants' digital literacy: Capacity to use digital technology; Capacity to exploit information and digital data; Capacity to create digital content; Capacity to perform digital transactions. Accordingly, it is necessary for civil servants to take part in training programs to develop, update, and supplement their knowledge and skills about digital technology. Then, the civil servants could become digital civil servants with essential

digital capacities such as: capacity to use digital technology, exploit information and digital data and create digital content, digital transactions.

Capacity to use digital technology (CU). This is an essential capacity, a mandatory requirement for civil servants to perform tasks in the digital environment. To develop this capacity, there are requirements for civil servants: Civil servants need to be able to recognize, select and use technology applications - specialized tools and software effectively to their public duty performance in the digital environment (CU1); Civil servants are capable of recognizing and analyzing data, information, and digital content necessary to operate software of electronic office system in performing public duties in the digital environment (CU2); Civil servants are competent to operate digital devices (computers, smartphones, tablets, etc.) to perform public duties in the digital environment with results and efficiency as required (CU3).

Capacity to exploit information and digital data (CE). This refers to the capacity to access, evaluate, utilize and share information and data that civil servants need to master to perform professional tasks so that work results and quality could be achieved as planned. To develop this capacity, there are requirements for civil servants: Civil servants can recognize, search and filter necessary information to meet job requirements in the digital environment (CE1); Civil servants are able to evaluate the accuracy and reliability of information and data and make choices about information and data to meet the requirements of public duty performance in the digital environment (CE2); Civil servants are capable of selecting and using appropriate tools to analyze, process information and data and store information and data effectively to serve their public duty performance in the digital environment (CE3); Civil servants are competent to manage information and data securely to serve advisory activities, perform assigned tasks in the digital environment (CE4).

Capacity to create digital content (CC). Capacity of creativity is an advanced requirement for every civil servant in public service. To develop this capacity, there are requirements for civil servants: Civil servants have the ability to develop information content and digital data to realize consulting ideas and organize the implementation of professional work to complete public duties in the digital environment (CC1); Civil servants are competent to integrate and edit existing information and data content into digital data to create new value to serve professional work to complete public duties in the digital environment (CC2); Civil servants are able to understand and put intellectual property rights into use in the digital environment, transmit digital content safely and securely (CC3).

Capacity to perform digital transactions (CP). This capacity enables civil servants to connect work and conduct transactions with organizations, individuals, and citizens conveniently and safely to effectively handle professional work in the digital environment. Accordingly, some requirements for civil servants are: Civil servants have the ability of understanding information and network security risks to proactively prevent them and conduct safe digital transactions while performing public duties in the digital environment (CP1); Civil servants are able to communicate and share information in the digital environment proficiently, safely and securely to effectively perform assigned tasks (CP2); Civil servants are competent to link and collaborate with organizations and individuals through proficient, safe and secure digital tools to completely carry out assigned tasks in the digital environment (CP3); Civil servants can interact and online participate in the community in a proficiently, safe and secure manner to well perform social management tasks in accordance with their professional fields in the digital environment (CP4).

If a digital competence framework is carefully studied, developed, promulgated and implemented as an efficient policy, there will be opportunities for civil servants to take part in training programs to update and supplement digital knowledge and skills for effective public service implementation in the digital environment; there will be tools for central and local agencies to evaluate civil servants' digital literacy as well as their working quality through their public duty performance results in the digital environment. With reference to findings mainly from researches by Hang, V.T.M. (2023) and Phuong, D.T. et al. (2023), this study further develops the criteria for the appraisal of civil servants in the digital environment. Accordingly, the research scale on "public duty performance results in the digital environment" (PPR) of civil servants includes: Civil servants are able to apply digital knowledge and skills to perform tasks to ensure the progress of assigned tasks (PPR1); Civil servants are competent to apply digital knowledge and skills to perform

assigned tasks and ensure the work quality (PPR2); Civil servants are proficient in working in the digital environment, best responding to the people's requests, creating satisfaction for the people (PPR3).

When civil servants have opportunities to participate in courses and training programs to develop, update, and supplement digital knowledge and skills and regularly practice performing professional tasks in the digital environment, they will become proficient entities to effectively complete public service activities in the digital environment. This is an important factor that helps facilitate the work performance of state agencies and organizations. Therefore, the initial research hypothesis of this study address on the relationship between civil servants' digital literacy and their work performance in the digital environment, which are: *Capacity to use digital technology (H1), Capacity to exploit digital information and data (H2), Capacity to create digital content (H3), Capacity to perform digital transactions (H4) are well implemented has a positive impact on the quality of civil servants and their public duty performance results in the digital environment.*

Based on the preceding researches, this study has developed the theoretical framework on digital literacy and its influence on civil servant's public duty performance results in the digital environment with the 5-factor model. /scale: 04 scales - independent variables "Capability to use digital technology" (CU), "Capability to exploit digital information and data" (CE), "Capability to create digital content" (CC), "Capacity to perform digital transactions" (CP) and 01 scale – a dependent variable "Public duty performance results in the digital environment" (PPR). These scales include 17 observed variables, designed into 17 questions in the survey questionnaire and measured using a 5-level Likert scale: 1 - Strongly disagree; 2 - Disagree; 3 - No opinion; 4 - Agree; 5 - Strongly agree (Table 1, Figure 1).

Table 1. Theoretical framework

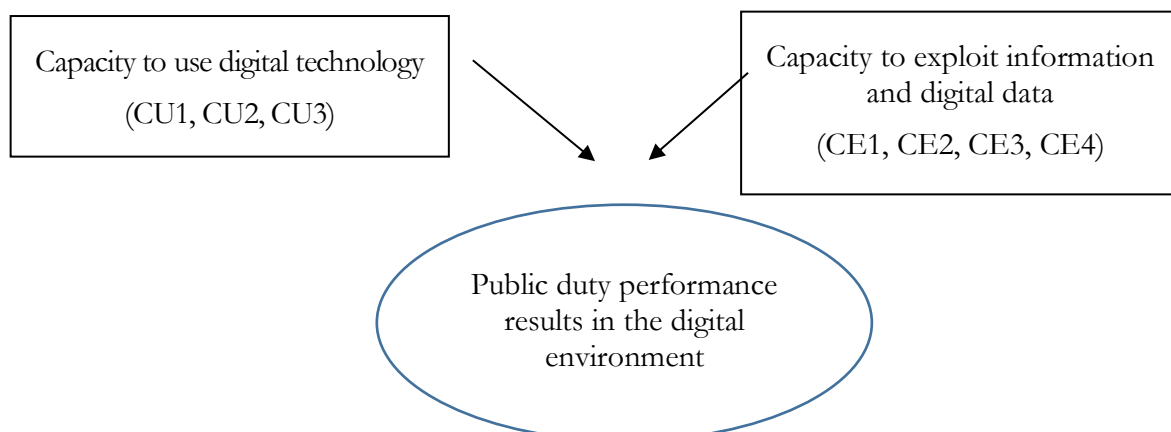
No	Scales	Code	5-level Likert scale				
			1	2	3	4	5
I	Capacity to use digital technology	CU					
1	Civil servants need to be able to recognize, select and use technology applications - specialized tools and software effectively to their public duty performance in the digital environment.	CU1					
2	Civil servants are capable of recognizing and analyzing data, information, and digital content necessary to operate software of electronic office system in performing public duties in the digital environment.	CU2					
3	Civil servants are competent to operate digital devices (computers, smartphones, tablets, etc.) to perform public duties in the digital environment with results and efficiency as required.	CU3					
II	Capacity to exploit information and digital data	CE					
4	Civil servants can recognize, search and filter necessary information to meet job requirements in the digital environment.	CE1					
5	Civil servants are able to evaluate the accuracy and reliability of information and data and make choices about information and data to meet the requirements of public duty performance in the digital environment.	CE2					
6	Civil servants are capable of selecting and using appropriate tools to analyze, process information and data and store information and data effectively to serve their public duty performance in the digital environment.	CE3					
7	Civil servants are competent to manage information and data securely to serve advisory activities, perform assigned tasks in the digital environment.	CE4					

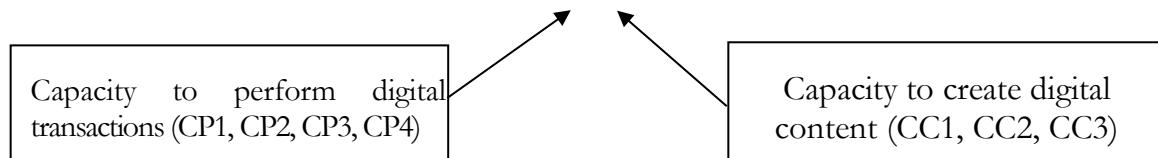
No	Scales	Code	5-level Likert scale				
			1	2	3	4	5
III	Capacity to create digital content	CC					
8	Civil servants have the ability to develop information content and digital data to realize consulting ideas and organize the implementation of professional work to complete public duties in the digital environment.	CC1					
9	Civil servants are competent to integrate and edit existing information and data content into digital data to create new value to serve professional work to complete public duties in the digital environment.	CC2					
10	Civil servants are able to understand and put intellectual property rights into use in the digital environment, transmit digital content safely and securely.	CC3					
IV	Capacity to perform digital transactions	CP					
11	Civil servants have the ability of understanding information and network security risks to proactively prevent them and conduct safe digital transactions while performing public duties in the digital environment.	CP1					
12	Civil servants are able to communicate and share information in the digital environment proficiently, safely and securely to effectively perform assigned tasks.	CP2					
13	Civil servants are competent to link and collaborate with organizations and individuals through proficient, safe and secure digital tools to completely carry out assigned tasks in the digital environment.	CP3					
14	Civil servants can interact and online participate in the community in a proficiently, safe and secure manner to well perform social management tasks in accordance with their professional fields in the digital environment.	CP4					
V	Public duty performance results in the digital environment	PPR					
15	Civil servants are able to apply digital knowledge and skills to perform tasks to ensure the progress of assigned tasks.	PPR1					
16	Civil servants are competent to apply digital knowledge and skills to perform assigned tasks and ensure the work quality.	PPR2					
17	Civil servants are proficient in working in the digital environment, best responding to the people's requests, creating satisfaction for the people.	PPR3					

Source: Compiled by the authors from the literature review

Research Model

Figure 1. Research model





Methodology

Qualitative and quantitative methods are used to collect and analyze secondary and primary data, then draw research conclusions. The collection and analysis of secondary data is conducted through published documents, combined with the collection and analysis of primary data through a direct survey of 360 commune-level civil servants' opinion. The collection of primary data are conducted through two steps: preliminary survey and official survey.

Preliminary Survey

The theoretical framework of this study includes a model of 05 scales: 04 scales - independent variables "Capability to use digital technology" (CU), "Capability to exploit digital information and data" (CE), "Capability to create digital content" (CC), "Capacity to perform digital transactions" (CP) and 01 scale – a dependent variable "Public duty performance results in the digital environment" (PPR). These scales include 17 observed variables, designed into 17 questions in the survey questionnaire as summarized in Table 1. In quantitative research, the minimum sample size needs to conduct the factor analysis for the 5-scale model with 17 observed variables is $N = 17 \times 5 = 85$ [Hai, D.H., 2019].

The sample size used in this study is $N = 360 > 85$, showing high reliability for conducting the survey research. After the survey was completely designed, the preliminary survey was carried out in Thai Binh province with a sample size of $N = 120$ commune-level civil servants. The results show that the observed variables are reliable enough to be used in the official survey on a broader scale.

Official Survey

The official survey were conducted in 3 provinces representing 3 regions of Vietnam, including: Thai Binh province (Northern region), Quang Nam province (Central region), Tay Ninh province (Southern region). The survey was selectively carried out. Accordingly, the preliminary interviews were performed to capture information, then survey forms was distributed if the civil servants were willing to answer. The survey received 360/360 valid votes, achieving a 100% response rate.

The collected data were used for the scale testing, exploratory factor analysis, and regression analysis to test the research hypothesis.

Findings

After the data was collected from a survey of 360 commune – level civil, a Cronbach' Alpha test was performed to identify the reliability of the scales and observed variables in the research model. According to Hai, D.H. (2019), the scale and observed variables are reliable when they meet the standard conditions: Cronbach 'alpha

> 0.6; Corrected Item-Total Correlation > 0.3. The test results show that all 5 scales and 17 observed variables are reliable as required [Table 2].

Table 2. Statistical results and testing results of the scales

Scales	Observed variables	N	Min	Max	Mean	Std. Deviation	Cronbach ' Alpha	Corrected Item-Total Correlation
Capacity to use digital technology (CU)	CU1	360	2	5	3.78	.681	.746	CU1 = .434
	CU2	360	2	5	4.01	.692		CU2 = .456
	CU3	360	1	5	3.92	.674		CU3 = .448
Capacity to exploit information and digital data (CE)	CE1	360	1	5	3.65	.703	.735	CE1 = .459
	CE2	360	1	5	3.71	.721		CE2 = .438
	CE3	360	1	5	3.58	.720		CE3 = .431
	CE4	360	1	5	3.49	.699		CE4 = .415
Capacity to create digital content (CC)	CC1	360	1	5	3.29	.729	.694	CC1 = .411
	CC2	360	1	5	3.43	.705		CC2 = .393
	CC3	360	1	5	3.38	.718		CC3 = .392
Capacity to perform digital transactions (CP)	CP1	360	2	5	3.99	.623	.691	CP1 = .501
	CP2	360	2	5	4.02	.654		CP2 = .502
	CP3	360	2	5	4.01	.647		CP3 = .492
	CP4	360	1	5	3.97	.675		CP4 = .477
Public duty performance results in the digital environment (PPR)	PPR1	360	1	5	3.78	.604	.701	PPR1 = .486
	PPR2	360	2	5	3.86	.612		PPR2 = .474
	PPR3	360	2	5	3.87	.630		PPR3 = .491
Valid N (listwise)		360						

Source: Authors' survey results

The data in table 2 shows observations of the scales "Capacity to use digital technology" (CU), "Capacity to exploit digital information and data" (CE), "Capacity to create digital content" (CC), "Capacity to perform digital transactions" (CP) and "Public duty performance results in the digital environment" (PPR) are all evaluated at an average level of Mean > 3.2 and Mean < 4.03, statistically significant according to the Likert scale (1-5); In general, civil servants' digital literacy is at elementary level, but not advanced level. This reveals that civil servants' digital knowledge and skills still need to be trained, updated and supplemented so that they could become digital civil servants and well perform assigned tasks in the digital environment. The results also show that civil servants, themselves, have not proactively updated and supplemented digital knowledge and skills to develop their digital literacy; Education and training policies are still not highly effective in encouraging civil servants to proactively study to update and supplement digital knowledge and skills to complete their professional work in the digital environment. This has a great influence on the public duty performance in the digital environment as well as the quality of local civil servants in Vietnam.

With standard test values, 5 scales and 17 observed variables in the model continued to be used to perform exploratory factor analysis. The exploratory factor analysis was conducted with Varimax rotation to preliminarily evaluate the unidimensionality, convergent validity, and discriminant validity of the scales. The analysis results are shown in Table 3, Table 4 below.

Table 3. Total Variance Explained

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.741
Bartlett's Test of Sphericity	Approx. Chi-Square	3102.548
	df	119
	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	4.875	31.045	31.045	4.875	31.045	31.045	2.751	17.780	17.780
2	2.355	15.395	46.450	2.355	15.395	46.450	2.370	15.387	33.277
3	1.784	11.727	58.286	1.784	11.727	58.286	2.167	14.123	47.510
4	1.165	7.858	66.254	1.165	7.858	66.254	2.011	13.148	60.768
5	1.006	6.238	72.603	1.006	6.238	72.603	1.784	11.724	72.603
6	.658	4.688	77.401						
...						
17	.126	.742	100.000						

Extraction Method: Principal Component Analysis.

Source: Authors' survey results

Table 4. Rotated Component Matrix**Rotated Component Matrix^a**

Scales	Observed variables	Component				
		1	2	3	4	5
Capacity to use digital technology (CU)	CU1	.610				
	CU2	.604				
	CU3	.598				
Capacity to exploit information and digital data (CE)	CE1		.625			
	CE2		.614			
	CE3		.601			
	CE4		.618			
Capacity to create digital content (CC)	CC1			.603		
	CC2			.597		
	CC3			.611		
Capacity to perform digital transactions (CP)	CP1				.605	
	CP2				.627	
	CP3				.618	

	CP4				.635	
Public duty performance results in the digital environment (PPR)	PPR1					.631
	PPR2					.624
	PPR3					.594
Extraction Method: Principal Component Analysis.						
Rotation Method: Varimax with Kaiser Normalization.						
a. Rotation converged in 8 iterations.						

Source: Authors' survey results

The data in Table 3 and Table 4 show: $KMO = 0.741 > 0.5$, confirming that exploratory factor analysis is appropriate for the data set; The Bartlett test has an observed significance level $Sig. = 0.000 < 0.05$, showing that the observed variables have a linear correlation with the representative factor; Total Variance Explained with Cumulative % = 72.603% > 50%, pointing out that 72.603% of the variation of representative factors is explained by observed variables; All observed variables have Factor Loading > 0.5, revealing that the observed variables have good statistical significance; The observed variables are extracted into 05 factors corresponding to 05 original factors with Eigenvalues > 1, showing that the original research model is maintained and scientifically appropriate, confirming the suitability of the theoretical model for the research on civil servants' digital literacy with 5 scales and 17 initially observed variables.

The results of the exploratory factor analysis show that all 5 scales and 17 observed variables are reliable and have good statistical significance. This allows multivariate linear regression analysis to be performed to examine the relationship of the scales in the research model: 04 scales - independent variables "Capacity to use digital technology" (CU), "Capacity to exploit digital information and data" (CE), "Capacity to create digital content" (CC), "Capacity to perform digital transactions" (CP) and 01 scales - dependent variable "Public duty performance results in the digital environment" (PPR). The results of the regression analysis are shown in Table 5 below.

Table 5. The results of multivariate regression analysis

		Coefficients ^a					
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	VIF
		B	Std. Error	Beta			
1	(Constant)	.732	.313		2.784	.000	
	Capacity to use digital technology (CU)	.413	.063	.427	8.223	.000	1.745
	Capacity to exploit information and digital data (CE)	.221	.057	.249	4.912	.000	1.745
	Capacity to create digital content (CC)	.109	.035	.063	2.565	.000	1.745
	Capacity to perform digital transactions (CP)	.257	.058	.261	2.995	.000	1.745
a. Dependent Variable: Public duty performance results in the digital environment (PPR)							
Adjusted R Square: 0.668; Durbin-Watson: 2.125							

Source: Authors' survey results

The data in Table 5 show Adjusted R Square = 0.668, confirming that the scales variables "Capacity to use digital technology" (CU), "Capacity to exploit digital information and data" (CE), "Capacity to create digital content" (CC), "Capacity to perform digital transactions" (CP) explain 66.8% of the variation in the scale "Public duty performance results in the digital environment" (PPR); The multivariate regression model is suitable for the data set; the suitability of the initial theoretical model for the research on civil servants' digital literacy with 5 scales and 17 observed variables is confirmed.

The variance exaggeration factor: $VIF = 1.745$ ($1 < VIF < 2$), showing that the regression model does not have multicollinearity. Durbin-Watson = 2.125 ($1 < d < 3$) shows that the regression model does not have autocorrelation. Unstandardized regression coefficients of 4 independent variables "Capability to use digital technology" (CU), "Capability to exploit digital information and data" (CE), "Capability to create digital content" (CC), "Capacity to perform digital transactions" (CP) all have positive values ($B > 0$) and are statistically significant (Sig. < 0.05), showing that these four factors are all positively correlated with the factor/scale "Public duty performance results in the digital environment" (PPR); Hypotheses H1, H2, H3, H4 are accepted.

On the basis of the generalized regression model $Y = B_0 + B_1 \cdot X_1 + B_2 \cdot X_2 + \dots + B_i \cdot X_i$ [Hai, D.H., 2019], the multivariate regression model of this study can be determined as follows:

$$PPR = 0.732 + 0.413 \cdot CU + 0.221 \cdot CE + 0.109 \cdot CC + 0.257 \cdot CP$$

Based on the standardized regression coefficient [Table 5] and the above regression model, it can be seen that the correlation level of the independent and dependent variables in ascending order is: "Capability to create digital content" (CC), "Capability to exploit digital information and data" (CE), "Capability to perform digital transactions" (CP), "Capability to use digital technology" (CU). This shows that, in general, commune - level civil servants have not proactively updated and supplemented digital knowledge and skills to develop their digital literacy; therefore, the capacities to create digital content and exploit information are not effectively used or rated at a low level. The results of the regression analysis are also evaluated the same as the results of the statistical and testing results as explained in Table 2. This reveals that Education and training policies are still not highly effective in encouraging civil servants to proactively study to update and supplement digital knowledge and skills to complete their professional work in the digital environment.

Conclusion

Based on the analysis and testing results, the research conclusions are confirmed: (1) Civil servants' digital knowledge and skills are not sufficient enough, so there is a need of training programs to equip, update and supplement digital knowledge and skills to enable them become digital civil servants and well perform assigned tasks in the digital environment; (2) civil servants, themselves, have not proactively updated and supplemented digital knowledge and skills to develop their digital literacy; (3) education and training policies are not highly effective enough to encourage civil servants to proactively learn to update and supplement digital knowledge and skills to serve professional tasks in the digital environment. This has a great influence on the public duty performance in the digital environment, affecting the quality of local civil servants in Vietnam today.

These findings suggest recommendations, which are: Implementing appropriate training policies, in the direction of encouraging civil servants to study and train regularly to update and supplement their digital knowledge and skills so that the requirements of the job positions in the public service could be met in the context of digital transformation and modernization of the administrative system. Accordingly, local authorities, in their role as the entities of management and employment of civil servants, in addition to implementing training policies to meet rank standards and job position requirements, need to carry out policies encouraging civil servants to regularly have self - training and promote their proactive learning to update and supplement.

The implementation of the incentive policies is necessary and of great significance, because e-government development not only is an inevitable trend stemming from the achievements of the Fourth Industrial Revolution but also impacts public service activities which require civil servants to update a lot of information, knowledge, and digital skills. If public servants do not promptly recognize these changes to proactively learn and government agencies do not have regular incentive policies, there will lead to a situation that public servants lack the initiative to update and supplement new digital knowledge and skills in accordance with the digital social development trends for practical application during their public duty performance.

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